

# THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

Published every Thursday Morning by David Williams Co., 232-238 William St., New York.

Vol. 73: No. 25.

New York, Thursday, June 23, 1904.

\$5.00 a Year, including Postage.  
Single Copies, 15 Cents.

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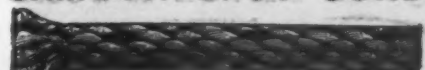


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See Page 24.



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# THE IRON AGE

THURSDAY, JUNE 23, 1904.

## The Gleason 15-Inch Shearing Cut Bevel Gear Planer.

A new type of bevel gear planer, capable of cutting bevel and miter gears up to a diameter of 15 inches, has recently been patented by the Gleason Works, Rochester, N. Y. The accompanying half-tone, Fig. 1, gives a general view of the machine, and Fig. 2 shows its construction in more detail. A peculiarity of the machine is that it removes the metal with a shearing cut, this being taken with the side of the cutting tool, as shown in Fig. 3. Bevel gears having a ratio of 5 to 1 can be cut providing the larger gear is not more than 15 inches in diam-

following a path conforming to the contour of the tooth, is obtained by rolling and advancing the arm on which the tool carriage reciprocates. This movement is controlled by a rotary former or positive motion cam, the character of which may be seen in Fig. 1. The follower is located on the outside face of a segmental bevel gear, C, Fig. 2, pivoted on the rock shaft, about which the tool carriage arm is rotated. This segmental gear is connected to the shaft during the cutting of the upper face of the tooth. The symmetrical but opposite movement required for the lower face is obtained by a second segmental gear, D, which is oscillated in the opposite direction from the first by an intermediate bevel gear, E. During the cut-

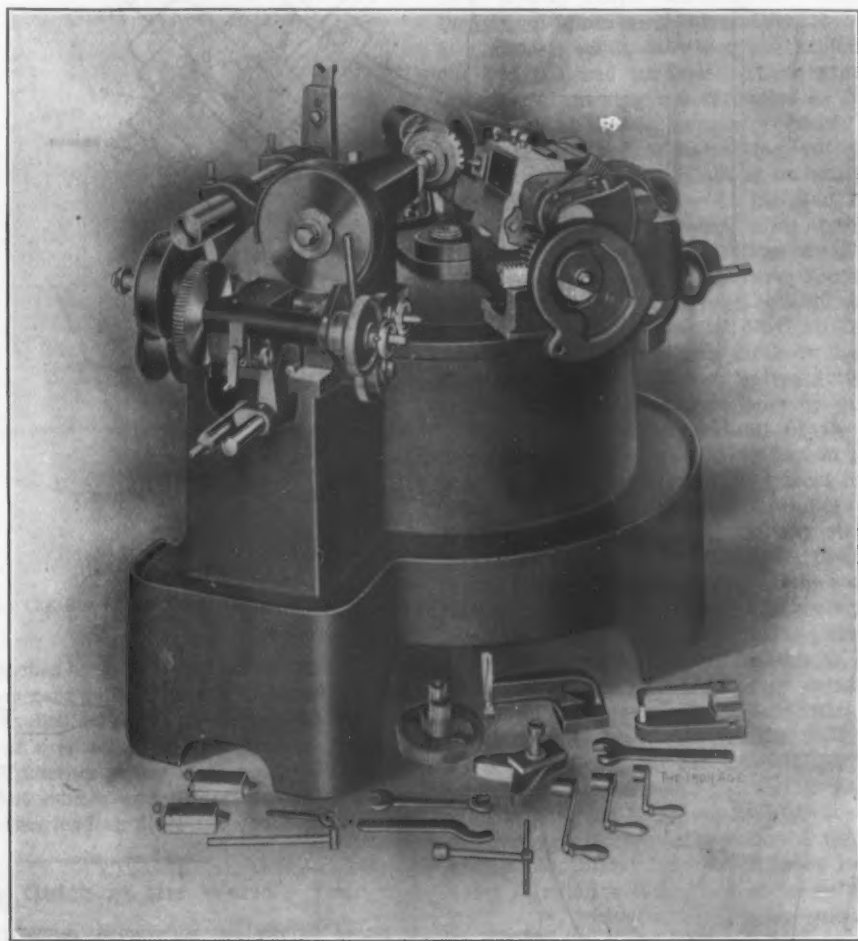


Fig. 1.—General View of the Machine, Showing Also the Cone Distance Gauge and Various Other Accessories.

eter, and steel gears of three diametral pitch can be cut to good advantage.

When the machine is in operation the gear blank is held stationary while the tool is cutting and is rotated by an indexing mechanism at the completion of the cutting of one side of each tooth. The first operation consists in the taking of a "stocking" cut completely around the blank with a V-tool of the form shown in Fig. 4. The tool is then changed for an upper cut tool, and one side of each tooth is cut during a second revolution of the blank. The same is repeated during a third revolution, using an undercut tool, which forms the opposite side of each tooth and completes the gear. The effect of a shearing cut is obtained by the tool rolling as it advances into the work. As a result, the profile of the teeth in the gear is cut perfectly smooth and no tool marks show.

The peculiar motion of feeding the tool into the work,

ting of the lower face of the teeth the segment D is connected to the shaft of the arm and C disconnected from it, and, *vice versa*, C is connected and D is disconnected during the cutting of the upper face of the tooth. It is understood, of course, that the movement of the arm is imparted at one end in such a manner that the line of action of the tool at all times converges to a common center coincident with the point at which the cone lines of the gear blank intersect. The feeding of the tool is accomplished by turning the frame supporting the cutting mechanism horizontally about the center O. The tool having advanced to its full depth, the feeding mechanism encounters an adjustable stop, F, Fig. 2, the tool is quickly withdrawn, and the indexing mechanism is set in motion, revolving the gear blank to present the next tooth to be cut. The reciprocating of the tool carriage is accomplished through a crank and connecting rod mechanism,

L, Fig. 2, the length of stroke being variable to suit the width of face of the blank which is being cut.

The operation of cutting a gear in this machine is briefly as follows: The gear to be planed, G, Fig. 2, is

the machine to which the cutting edges of the finishing tools always converge. As an aid in placing the gear blank, a cone distance gauge is furnished, shown in Fig. 5, and also to be seen on the floor in front of the machine,

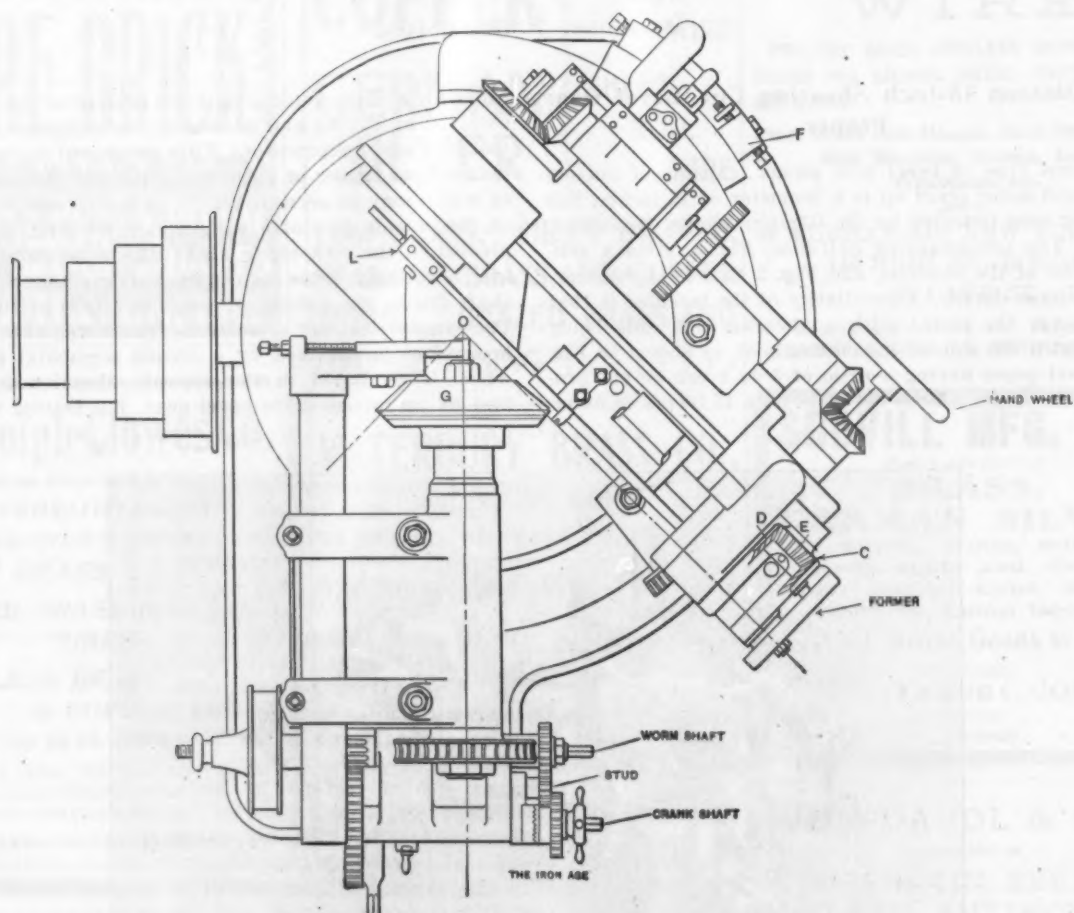


Fig. 2.—Plan View of the Bevel Gear Planer, Illustrating Its Operation.

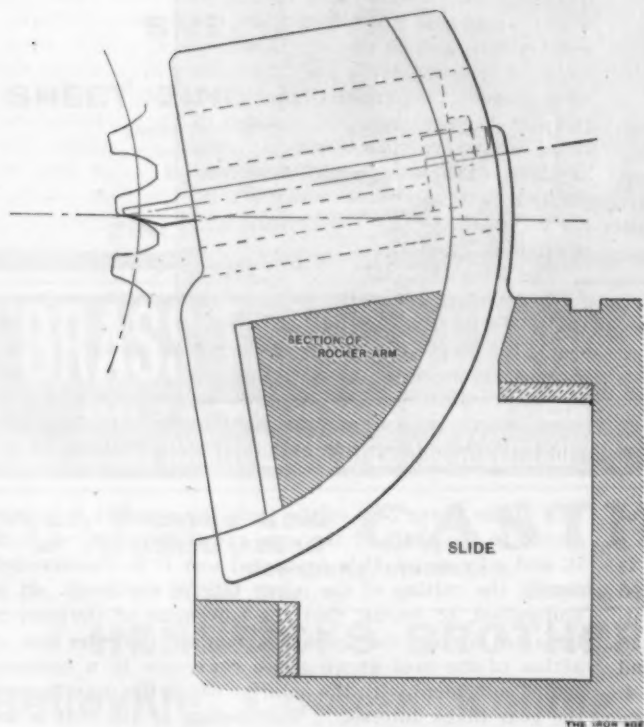


Fig. 3.—Section of the Rocker Arm, Showing the Position of the Tool in Cutting.

mounted on the work mandrel and carefully located in its proper position in the machine. The matter of locating is of great importance, as the cone lines must converge to the center O, this being the point at the center of

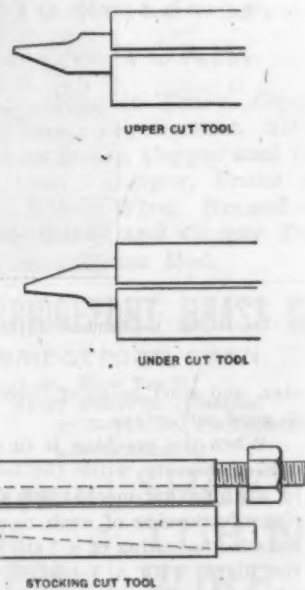


Fig. 4.—The Three Tools Used in the Planing of a Single Gear.

Fig. 1. In using this gauge the arm of the machine is set to the pitch line angle of the gear to be cut. The vernier slide A is set at the reading corresponding to the pitch depth or addendum of the tooth to be cut. The gauge is



mounted on the top of the arm, as shown in the figure, and is moved until the point of the vernier comes in contact with the outside edge B of the gear blank. The latter is then moved forward until the indicator points to zero, when it is in position to be cut.

A set of 19 bevel gear formers are furnished with each machine, sufficient to cut any bevel gears having axes at right angles within the capacity of the machine. These formers give a  $14\frac{1}{2}$ -degree spherical involute tooth. To select the formers to be used for the cutting of any particular gear it is only necessary to know the pitch line angle of the gear, when by referring to the table of the formers the corresponding one may be found.

As shown in Fig. 4, the cutting tools are held in adjustable boxes. Each tool, after being adjusted to its place in the machine, can be removed and replaced without further adjustment. The machine occupies a floor

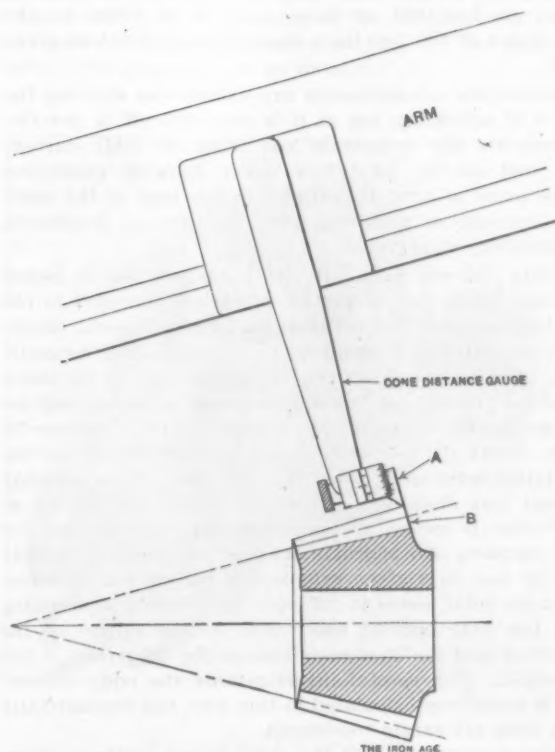


Fig. 5.—Showing the Use of the Cone Distance Gauge.

space of 5 feet 2 inches by 4 feet  $7\frac{1}{2}$  inches. It is driven through a four-step cone pulley, providing speeds of 492, 290, 193 and 117 revolutions per minute when the countershaft is running at a speed of 240 revolutions per minute. The indexing friction pulley is driven by a separate belt from the countershaft, and the oil pump by a separate round belt also leading from the countershaft.

### The Mining Gulch at the World's Fair.

An area of 12 acres, occupying the ravine between Art Hill and the Plateau of States, known as the Mining Gulch, is one of the most interesting places to visit at the World's Fair in St. Louis. A narrow gauge electric railroad, including in its equipment 15 mining cars, extends through the heart of the Gulch, affording its passengers an excellent view of the exhibits. There are 32 separate exhibits, most of which are now ready to receive visitors.

The Metal Pavillion, 60 x 100 feet, joins the Mines Building, at the north end of the Gulch, in which are operating exhibits illustrating electrical metallurgy and the smelting and refining of copper, zinc, lead and other metals and alloys. The Model Foundry, 100 x 110 feet, connects with the Metal Pavillion and is equipped with cupolas for melting iron and steel, crucible furnaces for casting brass, &c., electric cranes, coke ovens, and other equipment for molding, finishing and polishing castings of all kinds. In one portion of the building a reception room

and office has been arranged for the convenience of visiting foundrymen.

The Cement Pavillion, 80 x 130 feet, illustrates the use of concrete in architectural constructions. The raw material and processes for the manufacture of Portland cement are illustrated by samples and photographs. The Art Pottery shows the complete processes of manufacturing art pottery from the raw material, including molding, modeling and decorating. Expert modeling by hand and the decorating of vases by an artist are features of special interest. Jardinieres, vases, pedestals and all kinds of ornamental pottery are exhibited; also beautiful samples of French Siccard, Aurelian and other costly varieties of pottery. The Missouri fire brick exhibit shows the most modern methods in the manufacture of coal gas. A rear clinker bench furnace is being erected to show the processes used in gas works of moderate consumption.

Drilling for oil, water and gas, and prospecting with the diamond drill, are shown in operation in several exhibits in the central portion of the Gulch. The De Laval steam turbine exhibit shows a 55 horse-power turbine, with a high pressure pump. This pump has the power to lift a stream of water to a height of 850 feet. An actual placer trough is being installed and this pump will be used to illustrate placer mining.

The New Mexico turquoise mine exhibit, joining the New Mexico State Building, is a reproduction of the Porterfield mines near Silver City, N. M. Above ground is a miner's cabin, in which are exhibited specimens of cut and polished turquoise. Underground are 120 feet of tunnels, showing the turquoise as it is found in the rock, leads and veins, being reproduced. The exhibit also shows the method of extracting, cutting and polishing. The Mammoth Crystal Cave is an exact reproduction of the famous Crystal Cave in the Bad Land, near Deadwood, N. D. It represents 2 miles of the great cave, and shows stalagmites and stalactites brought from the original cave. Specimens of the rocks found in the cave are shown. The Carizzo copper exhibit shows a primitive copper smelter operated by Mexican Indians, and illustrates the old time mining methods used in Mexico and Western America. Eleven native artists are here who will make souvenirs from copper by unique methods.

The feature of the exhibit of the Anthracite Coal Mine is a scenic railroad 1740 feet in length, which carries the passenger through the inmost recesses of the coal mine. Automatic figures show familiar coal mine scenes, including the breaker boys sorting slate, the miners at work and at rest, a blasting scene, the disaster following a short fuse, a flood disaster, a miner overcome by black damp, a hospital scene and the underground stable for mine mules. The Arizona Mining Camp shows a mining camp of 25 years ago. In addition to the mining operations, which are shown in every detail, the miner's life in those days is carefully depicted. A large dancing pavillion, with platforms seating 2000, has been erected. Fifty "Rattlers," as the dancing girls are known, will be employed to delineate the various dances of the mines.

The Missouri Lead and Zinc Mining Plant shows how ore is separated from the rock. A typical mine as operated in Southwest Missouri is being installed. The Missouri Pavillion will be used as an exhibit room for Missouri ores, including lead, zinc, copper, coal and iron. The California Gold Mill will soon be complete, and will illustrate the methods of crushing the ore, extracting the gold and the amalgamation and concentration processes. The South Dakota Gold Reduction Plant will show the cyanide process of gold reduction. It is expected that from \$12,000 to \$16,000 worth of gold bullion will be produced from the ore during the exposition.

The United States Fuel Testing Camp is under the direction of the United States Geological Survey, and will show the most complete methods for testing on a large scale, the washing, briquetting, coking, gas making and steaming value of fuels. The report of these tests will be preserved and will constitute one of the permanent valuable documents produced by the exposition.

Asbestos, said to be of long fiber and good quality, has been discovered at Woodstock, Vt.

## The Commercial Testing of Sheet Steel for Electrical Purposes.\*

BY C. E. SKINNER, PITTSBURGH.

At the present time the rate of consumption of sheet steel in the manufacture of electrical apparatus in the United States alone is probably not less than 100,000,000 pounds per year. Assuming that 20 per cent. of this material is subjected to the conditions under which the so-called iron loss occurs, and that this loss is  $1\frac{1}{2}$  watts per pound, we find we have a total loss of 30,000 kw., or 40,000 horse-power, an amount of power approaching the output of the largest single electrical power station in existence. At the rate of \$25 per horse-power per year, this represents a money value of \$1,000,000. This loss manifests itself as heat in the apparatus and therefore serves no useful purpose, but forms one of the limitations to the output of the apparatus.

The losses referred to are the hysteresis and eddy current losses, more commonly combined under the general term "iron loss." This loss occurs in all magnetic material which is subjected to alternating magnetic stresses, the amount of the loss in any given material depending upon a number of conditions which will be referred to later.

In general, the following must be taken into consideration in connection with the testing of sheet steel for electrical purposes:

1. The losses in different sheet steels vary greatly with the chemical composition, and with the physical condition due to the heat treatment and the mechanical working which the steel has received.
2. In most sheet steel the losses may be reduced to a relatively small value by annealing.
3. Nearly all steels, when the losses are reduced to a low value by annealing, are subject in a greater or less degree to aging, or increase in loss, due to the influence of comparatively low temperatures.
4. The permeability of all steels which may be rolled commercially differs by a comparatively small amount, no matter what their condition with respect to annealing.
5. In all commercial sheet steels the physical characteristics are well above the service requirements.

The commercial testing of sheet steel for electrical purposes, therefore, resolves itself into:

- a. Chemical tests to determine the composition of the steel.
- b. Electrical tests to determine the losses in the steel after punching, before and after annealing.
- c. Electrical tests to determine whether aging, or increase in the losses, occurs when the steel is subjected to moderate temperatures.
- d. Tests for permeability.

### Chemical Tests.

Sheet steel used for electrical purposes is always a very mild steel, the carbon rarely being above 0.15 per cent.; the phosphorus, sulphur, silicon and manganese also usually being kept quite low. The composition may vary over comparatively wide limits and the steel still fulfill the necessary conditions as to quality. One or two complete analyses from each heat, and occasional check analyses from the sheet before and after annealing, are usually sufficient for the purpose.

### Electrical Tests.

By far the most important tests are those to determine the hysteresis and eddy current losses, either separately or combined, the amount of these losses showing the electrical quality of the steel.

**Hysteresis Loss.**—Hysteresis loss may be defined as the work done in reversing the magnetism in the steel, and it may be considered as the molecular friction due to the reversal of the magnetism, this friction manifesting itself as heat. The amount of hysteresis in a given steel varies with the composition, with the hardness, with the maximum induction at which the steel is worked, with the frequency of reversal of magnetism, with the wave form of the applied electromotive force used in the

test, and with the temperature of the test sample. The hysteresis loss is greater, as a rule, in hard steels than in soft steels. It varies approximately as the 1.6 power of the induction, and directly as the frequency. It is greater with a flat top or a sine wave electromotive force than with a peaked or a saw toothed wave.

Several instruments have been devised for measuring the hysteresis loss in steel. The Ewing hysteresis meter is probably the best known and most used. With this instrument samples weighing only a few ounces are required for the test, the measurements being made at a fixed induction and the instrument calibrated so as to read direct in some convenient unit. A complete description of this instrument and the method of its working may be found in the *Journal of the Institution of Electrical Engineers* (London), vol. 24, page 398. Other instruments employing the same general principle or entirely different methods are available for measuring hysteresis loss, but as these may all be found in the text books of the day their description will not be given here.

Hysteresis measurements are valuable as showing the effects of annealing, but as it is very difficult in practice to separate the hysteresis loss from the eddy current loss, and as the total loss under working conditions is the point of vital importance to the user of the steel, measurements of hysteresis loss alone become, in general, of secondary importance.

**Eddy Current Loss.**—By eddy current loss is meant the loss due to the circulation of electric currents in the sheets themselves and between the adjacent sheets, due to the steel acting as a conductor in an alternating magnetic field. The eddy current loss varies inversely as the ohmic resistance, directly as the square of the induction, and decreases as the temperature increases. It is greater in thick sheets than in thin sheets, and is greater as the insulation between adjacent sheets is less. Tests for eddy current loss alone are difficult to make, and, as far as the writer is aware, no instrument has been devised for this purpose. An approximation of the amount of eddy current loss in a given sample can be reached by measuring the total losses at different inductions and assuming that the eddy current loss varies as the square of the induction and the hysteresis loss as the 1.6 power of the induction. For special investigations the eddy current loss is sometimes calculated in this way, but commercially such tests are rarely considered.

The measurement of the total losses under working conditions gives the best index of the electrical quality of the steel. As the total loss is made up of the combined hysteresis and eddy current losses, it is subject to all the variations of each as outlined above.

**Measurement of Total Losses.**—In commercial routine testing, as followed out in the sheet steel testing department of the Westinghouse Electric & Mfg. Company, of which the writer has charge, two separate methods, which may be designated as the transformer method and the armature method, have been found very satisfactory. In both these methods of testing commercial conditions of operation have been aimed at, in order that the results obtained might be checked with the tests made on similar material in commercial apparatus. The test samples have also been so chosen that they will be available for commercial apparatus later, this effecting a considerable saving of material where many tests are made.

The transformer method has been so called for the reason that the test sample consists of about 10 pounds of punchings of a standard transformer plate, these punchings being built up in the same manner as when used in the transformer. For convenience in handling and winding the test sample a block carrying the coil has been devised, this block being split and the wires of the coil continued between the two parts by means of mercury cups and contacts. By this means samples which are built up or plates which are not split may be used and placed on the testing block with the winding in place in a few seconds. The routine tests on such samples consist in measuring the total losses at a given induction and frequency by means of a watt meter. For special tests the induction, frequency, wave form and the pressure on the sample are varied as desired.

\* Paper read before the American Society for Testing Materials, Atlantic City, N. J., June 16, 17, 18, 1904.



This test is used regularly for judging the quality of each lot of steel as received, for judging the quality of the annealing of each furnace load of material and for determining the aging on all classes of material. From 20 to 50 tests per day are made on this apparatus by one operator. In making tests of this kind, the wave form of the applied voltage must be known and should preferably be a sine wave; correction must be made for the copper loss in the magnetizing coil; correction must be made for the losses in the volt meter and watt meter, or these losses must be eliminated in the measurements; the test samples must be at approximately uniform temperature.

The armature method is so called for the reason that the test sample consists of standard armature punchings, which are revolved in a standard form of dynamo field. The measurements are made by means of a spring dynamometer. A testing device of this kind is illustrated in Fig. 1, and a detail drawing of the dynamometer used for reading the losses is shown in Fig. 2. The general plan of this apparatus is as follows:

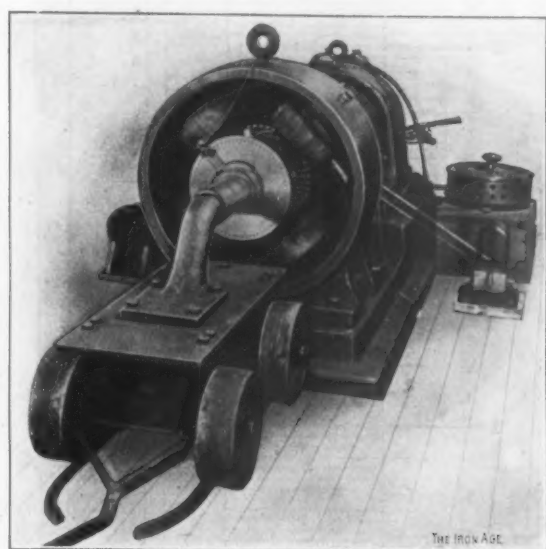


Fig. 1.—The Testing Device.

A small variable speed direct current motor has a shaft extension on which the sample is mounted. The speed is read in terms of voltage across the terminals of a small magneto which is belted to the motor shaft and shown to the right in Fig. 1. The test sample is revolved in a field having specially wound field coils and adjustable pole pieces. The extension shaft on which the sample is mounted carries a spring dynamometer, with a special device for reading the deflection on this dynamometer when the sample is in motion. The sleeve which carries the sample is provided with heavy flanges, and is adapted to be placed in an hydraulic press, so that any desired degree of pressure may be reached and maintained on the sample during the test.

#### The Spring Dynamometer.

The very unique spring dynamometer used in this device was designed by S. M. Kintner and deserves special notice. As will be seen from Fig. 2, the hollow shaft C contains a spiral spring, J, the inner end H being rigidly held to the shaft, while the outer end is fastened to the sleeve A, on which the sample is mounted. The shaft carries a pointer, E, and the sleeve a circular disk, D, approximately 8 inches in diameter, graduated on its beveled face in a uniform scale to small divisions. In close proximity to the scale is placed a spark gap, G, which is in series with the secondary of the induction coil S. The primary of the induction coil is connected to a contact device on the motor shaft, the break point being exactly in line with the pointer E. Leyden jars are used across the secondary of the induction coil to cut down

the duration of the spark. The scale and the pointer are shielded from the light of the room, and a tube, F, is provided for observing the scale and pointer at the exact angular position occupied when the spark passes across the air gap, illuminating the scale and pointer for an instant at each revolution of the shaft. By this means it is perfectly feasible to read to a high degree of accuracy the deflection of the spring when the scale and pointer are both revolving at a speed of from 1000 to 2000 revolutions per minute. The bearing between the sleeve and shaft is nicely ground and well lubricated, so that there is practically no friction whatever when the test sample is in motion. The apparatus is calibrated by measuring the torque on the spring for an observed deflection. The loss in the sample is then measured in terms of torque and speed, reducing this, if necessary, to the ordinary units of watts per pound in the test sample. For comparative work this reduction is not necessary.

By varying the field strength, the air gap, the form of pole pieces, the speed and the pressure on the sample, tests under a wide range of conditions are obtained.

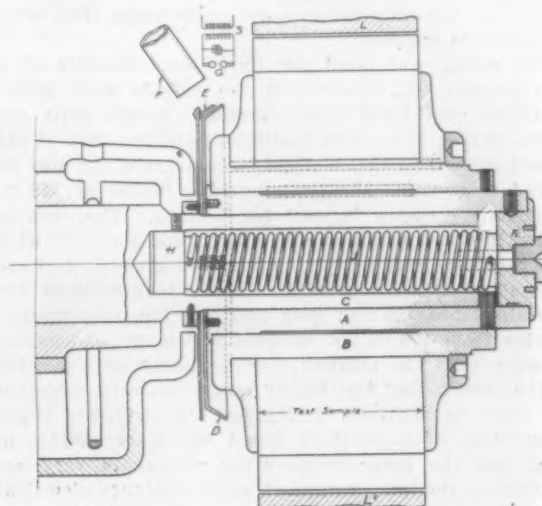


Fig. 2.—Sectional View of the Dynamometer for Measuring Armature Losses.

The windage may be measured by taking readings on the dynamometer with no current in the field. In special tests complete curves are taken at varying speeds and field currents. In routine tests only a few points are taken.

For convenience in handling the samples, which together with the sleeve weigh approximately 125 pounds, a special truck, shown in the foreground, Fig. 1, has been devised, by means of which the sample can be carried about and very quickly placed in position on the testing shaft with a minimum amount of labor.

The above apparatus is used for determining the quality of armature steel as received and the quality of the annealing. It forms a most convenient method of studying the variation in armature losses due to varying conditions, such as pressure, insulation between sheets, variation in induction, variation in form of armature slot, &c. The actual induction may be measured by means of a special coil slipped on the armature punching, the leads of which are brought out to a contact device mounted on the special truck used for carrying the test samples. The device has been in constant use for several months, and has been found so satisfactory that it may be confidently recommended to those desiring to make similar tests.

#### Test for Aging.

It was discovered about ten years ago that when sheet steel is annealed so as to have a low loss and then subjected to a temperature of from 80 to 100 degrees C. the loss sometimes increases, in some special cases this





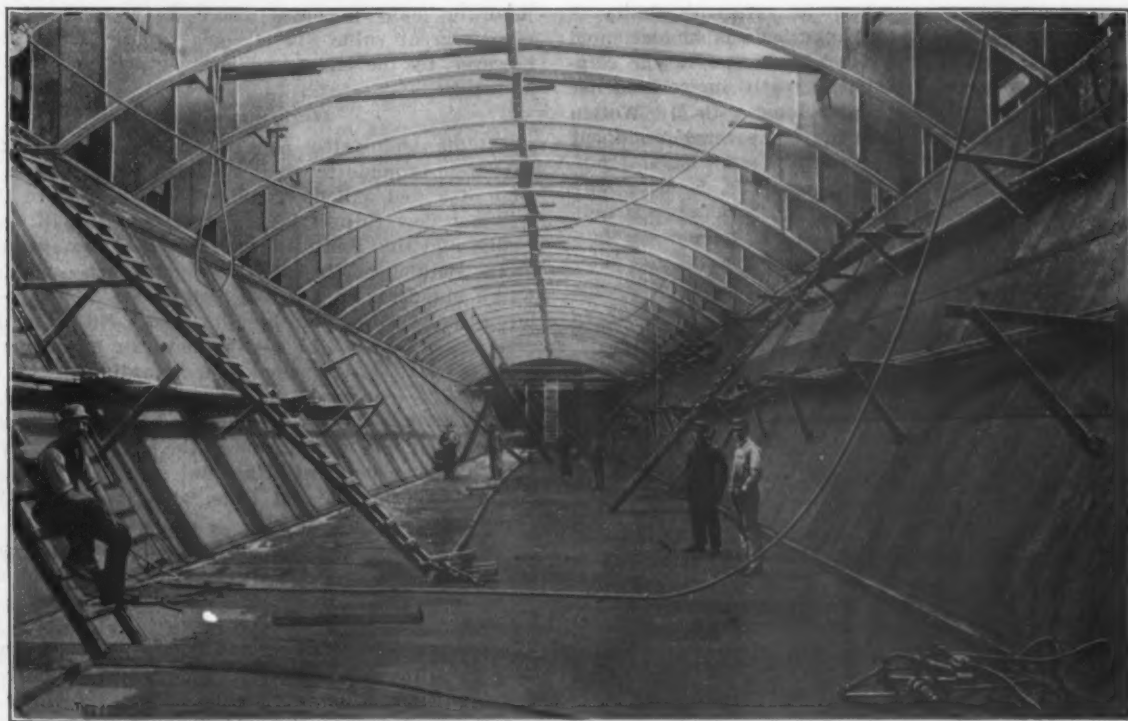
### The Steamship "Augustus B. Wolvin."

All records for vessel cargoes on the great lakes have been broken by the arrival at Duluth, Tuesday, June 14, of the steamship "Augustus B. Wolvin" with 10,300 net tons of coal, and by her scheduled loading this week of 10,000 gross tons of iron ore at the docks of the Duluth & Iron Range Railway. The greatest coal cargo previously carried into Lake Superior was on the steamship "I. L. Ellwood," of the United States Steel Corporation, Buffalo to Duluth, 7688 net tons, and the largest cargo of iron ore was that of the "Wm. Edenborn" of the same company, Escanaba to South Chicago, 8807 gross tons. In this latter cargo the ship was favored by a draft of 20 feet all the way, while the "Wolvin" is restricted to about 18.5 feet by the channels out of Lake Superior and by the fact that this is her first trip. The "Wolvin" should carry about 11,000 gross tons with all conditions favorable, and will doubtless make that mark this season.

The career of this ship will be watched with great

length of the ship, and by double bottom and sides carried clear up to the deck. The inner plating of this double skin forms the cargo hold, and in the "Wolvin" this is a hopper shaped box 409 feet long, 24 feet wide at the floor, 43 feet wide at top and 24 feet high. Another complicating problem, absolutely new in this ship, is the fact that this vast inner box is without strut or stanchion or post its entire length, so that the decks are not directly connected with the floor. This is solved by the use of steel built-up girder arches between the cargo hatches. The space between the outer and inner skins is utilized for water ballast, of which the ship will use from 4000 to 5000 tons when without cargo.

This inner box is made hopper shaped and free from posts in order that all cargo may be handled by automatic machines. It is expected the entire load of ore may be taken out by machines, thus absolutely eliminating the human ore shoveler from the economy of the trade. It will, moreover, permit the handling of cargoes at a speed that was unknown until a year or two



THE CARGO HOLD OF THE STEAMSHIP "WOLVIN," 409 FEET LONG.

interest, not alone for her unrivaled size, but on account of the revolutionary method of construction employed, the freedom from manual labor planned for cargo delivery and the net returns expected from the immense investment. Nothing could more closely typify the growth of marine traffic in the Northwest than this ship. She will move in her first cargo seven times the amount of ore taken down the lakes the initial year of navigation, and as much as was carried the full season of 1856. In grain this ship will practically empty a 1,000,000-bushel elevator in two trips, or take away the product of a 40,000-acre farm in one.

The ship is a great steel box, flat on the bottom and with sides vertical, so that a cross section is almost a rectangle, and is 560 feet long, 56 feet wide and 32 feet high. This box, which weighs with engines, &c., about 5000 tons, and with cargo about 17,000 tons, must be made sufficiently strong longitudinally to withstand the weaving and twisting strains induced by immersion in water, with a constantly unstable equilibrium that is at times much accentuated. Into the problem of strength a seriously complicating element is injected by the fact that one of the sides of the box has almost no strength at all, for the deck is pierced nearly its whole length by cargo hatches, each 33 feet long, at right angles to the ship, and with but 18 inches of deck space between them. The strength lost in this most important member is secured by extra steel keelson plates running the whole

ago. It is expected that the entire cargo may be taken out in four or five hours.

The most economical ship upon the lakes is not the vessel that makes the best time between ports, but that which, to use a Hibernicism, goes fastest when tied up; in other words, the ship whose terminal detentions are least. As compared with ocean traffic, the brief season, the runs of not more than 1000 miles and the numerous channels where speed is necessarily restricted, enforce this difference. So no attempt is made upon the lakes to get more than speed in which coal consumption is normal, but every facility is provided to assist in rapid loading and discharge. In this the "Wolvin" probably excels.

Wherever it has been possible to displace manual labor by steam or electricity on this ship the opportunity has been taken advantage of. All the steel hatch covers for the 33 cargo hatches are moved by steam engines; the two 4-ton anchors are handled by steam; capstans and windlasses are steam driven; the engines are steam governed; the steering is done by steam; fires are fed and ashes discharged by steam; ventilation is by steam. Much of this, of course, is common to all large ships.

Like most lake ships, the "Wolvin's" propelling machinery is located far astern, with the dining rooms and kitchens, messes and some of the quarters. Officers' quarters and those for guests are placed at the bow. The ship's driving machinery consists of one quadruple ver-

tical marine engine, with cylinders 18.5, 28.5, 43.5 and 66 inches, with 48-inch stroke. These are designed for a horse-power of 2000 at a normal speed of 80 revolutions. In practice they will considerably exceed this power. The valves of the high, first and second intermediate cylinders are of piston type, placed forward and driven by Joy radial gear. The low pressure is fitted with a double ported slide valve operated by double bar Stevenson link motion. The boilers are two Babcock & Wilcox, and fired from the center athwartship. The pressure is 250 pounds and steam is superheated. Stoking is by the Duluth type mechanical stoker, with coal fed to hoppers above and traveling on the grates through the fire box, dumping at the rear into an ash pit. There are seven Blake ship pumps. All lighting is by electricity, and there are duplicate plants.

This ship cost nearly \$500,000, and has been under construction since about December 1 last at the Lorain yard of the American Shipbuilding Company. The plan of her construction was initiated by A. B. Wolvin of Duluth, and she is owned by the Acme Steamship Company, organized to operate her. Mr. Wolvin's ability as a practical ship manager and financier was supplemented by that of J. C. Wallace, general manager of the shipbuilding company, who assisted greatly in working out the details of construction. Associated with Mr. Wolvin in the Acme Steamship Company are several prominent steel and vessel men of the Central West.

### Alloy Steels.\*

BY WILLIAM METCALF, PITTSBURGH.

The term "alloy steels" is used chiefly to distinguish steels containing influencing quantities of metals other than iron from the ordinary steel of commerce known as carbon steel, in which iron and carbon are the influencing elements for use, other elements being considered more as impurities than as useful ingredients. There are three kinds of carbon steel of universal use—namely, crucible, Bessemer and open hearth. Their discussion does not belong properly to our subject, but it may be observed that they contain small quantities of phosphorus, sulphur, silicon and manganese, as well as oxygen, nitrogen and hydrogen. Copper and arsenic are present sometimes, but not so generally or in such quantity as to require the careful analyses that are necessary for other ingredients. Certain small percentages of silicon and of manganese are often regarded as useful for special purposes, but not in such quantities as to justify their giving any specific name to the steel.

From time to time we have put upon the market silicon steel, phosphorus steel, chrome steel, aluminum steel, none of which have won any permanent place in commerce. Of permanent alloy steels, we have nickel steel, manganese steel, self hardening or air hardening steel, and the latest, the new variety called high speed steel.

#### Nickel Steel and Manganese Steel.

Nickel steel, containing comparatively small percentages of nickel, is used chiefly for structural purposes, giving increased strength and toughness. It has been applied mostly to armor plates and gun parts, and lately it is being tested largely in rails to determine whether the increase in durability in difficult places will justify the greater cost over ordinary Bessemer or open hearth rails.

Hadfield's manganese steel is unique. Hard, tough, non-magnetic, nonhardening by quenching, nonannealable by any known method, practically unmachineable; it stands by itself, there is nothing to compare it to nor to test it by. It is finding large use for a number of special purposes.

#### Self Hardening or Air Hardening Steel.

This steel derives its name from the fact that when it is heated to an orange color and allowed to cool slowly in the air it becomes exceedingly hard. Some years ago it was known generally as Mushet steel, from the fact that its first development was due to the distinguished metallurgist whose name it bore. The usual composition

of this steel is about 2 to 3 per cent. manganese, 4 to 6 per cent. tungsten, and carbon high.

The distinctive, persistent hardness of manganese steel indicates that it is manganese that gives this steel its so-called self hardening property. This was confirmed many years ago by Langley, who found that steel high in carbon, containing about 4 per cent. tungsten and minute quantities of manganese, had no self hardening property, and that the same steel remelted, so as to contain 3 per cent. manganese, became an excellent self hardening steel. Langley next showed by his beautiful emery wheel test that tungsten is the element that acts as a mordant to hold the carbon in solution at a high temperature, giving this steel its most valuable property, that of remaining hard at a comparatively high temperature, so that a tool made of it could be used for cutting metals at a high speed, the tool continuing to do its work at a temperature, caused by the enormous friction of the high speed, that would soften completely and render useless the best carbon steel tool that could be made. This very useful variety of steel has a large place in the markets, being used for many purposes where its peculiar properties give it great value. It is being rapidly overshadowed, however, by the latest and most surprising steel of all, known as

#### High Speed Steel.

Air hardening steel, as a rule, is not tough—that is to say, if it is made tough it will not be very hard. The edge of a tool will flow, and when it is so hard that it will not flow then it is so brittle that it will crumble easily, and this limits its usefulness. A few years ago, at the Bethlehem Steel Works, some person—whether he was a blunderer or a genius history does not say—revolutionized the whole machine business. Either by design or accident he heated a tool made of air hardening steel until it was nearly melted, and according to the traditions and teachings of the ages the tool was ruined utterly. Again, either by accident or design, this "ruined" tool was put into service, and to the amazement of everybody it did an unheard of amount of work. This led to further experiments and tests, and the Taylor-White process was developed.

This process consisted in heating a tool excessively hot and cooling it by successive stages, producing a tool that would cut at enormous speed for metal work, and take off chips that developed enough heat to blue them. The process was patented, and therefore it is not necessary to go into a long explanation here, especially as it has been superseded. The process seems to have been uncertain—that is to say, when a tool was handled just right it produced results that were wonderful, and when the manipulations were not exactly right the results were nil.

The potentialities were so great that nearly all of the leading steel makers in the world attacked the problem, with the result that the present high speed steels are in no sense of the words air hardening. Manganese has been reduced from 3 to 4 per cent. to 0.30 per cent. to traces; tungsten has been increased to 10 to 20 per cent., instead of the usual 4 to 6 per cent., and the carbon is generally less than 1 per cent.

There are about 50 different brands on the market, and of course each one is the best. Perhaps the analyses of two of the leading brands will be interesting, as follows:

|                  | Per cent. | Per cent.      |
|------------------|-----------|----------------|
| Tungsten .....   | 9.99      | 18.48          |
| Chrome .....     | 2.83      | 2.90           |
| Carbon .....     | 0.69      | 0.78           |
| Phosphorus ..... | 0.010     | Not determined |
| Sulphur .....    | 0.010     | Not determined |
| Silicon .....    | Trace     | Not determined |
| Manganese .....  | Trace     | 0.33           |

Another contains the following:

|                  | Per cent. |                  | Per cent. |
|------------------|-----------|------------------|-----------|
| Molybdenum ..... | 9.65      | Phosphorus ..... | 0.016     |
| Chromium .....   | 0.06      | Silicon .....    | 0.046     |
| Carbon .....     | 0.66      | Manganese .....  | 0.22      |

In one sense, it is chaos. All traditions as to heating are completely reversed, and no one really knows what is the best. One brand is famous for its excellence in one kind of work, another in another kind, no one yet seeming to cover all of the ground.

\* Read before the American Society for Testing Materials, Atlantic City, N. J., June, 1904.



### Machine Shop Practice Revolutionized.

One thing is certain, the machine business is revolutionized. These tools have crowded ordinary lathes, planers, drills, &c., away beyond their capacity; machine builders are remodeling their machines to meet the new conditions, and many of the users are throwing out their old machinery for the new, or else remodeling and strengthening what they have.

There are many records published of the work done by this steel, giving speed per minute, feed, depth of cut, &c., so that it is not necessary to repeat them here. A few illustrations of what can be done may be interesting.

In one case a couple of steel cast bed plates about 4 feet wide and 9 feet long were to be planed. There was nominally  $\frac{1}{2}$  inch to come off, but the unevenness of the casting made the cut about 1 inch in places. The surface was hard and gritty from the sand of the mold. Several tools were tried, each one going about  $\frac{1}{2}$  inch and then having to be reground. Next, one tool cut about 2 inches without grinding. Finally, a tool was tried that had turned up a large, rusty, cast iron pulley without grinding, and it cut clear across the bed plates and was still in good condition for further work. It is clear that the cost per pound of that tool cut no figure.

Another party had a great many castings to thread, with dies made of the very best carbon steel. He could at moderate speed thread from 2000 to 3000 pieces without grinding; with dies made of high speed steel, and with his machine running as fast as he could drive it, he threads from 20,000 to 30,000 pieces without grinding. Another party turns many pieces of hard brasses. He found it difficult to get a tool that would cut them at all until he tried the right high speed steel, and made a tool that would cut all day without grinding, running his lathes at the highest speed he could get. The same party bores many cast iron cylinders, and with tools made of steel that would not cut his brass he bores eight to ten cylinders without regrinding, and at a speed so great that the cylinders came out too hot to be handled with the naked hand. He tried in his cylinders the steel that cut his brass so well, and it would only bore two to four cylinders without grinding.

Another party drills  $2\frac{3}{8}$ -inch holes 7 inches deep in soft steel forgings, drilling a hole in about three minutes; the same steel will not make a good threading die for the same forgings, and for this he uses another brand. Neither of these steels will make a good lathe tool for turning these forgings, and for this work he uses a third brand.

All of these brands, upon analysis, would come within the limits of the analyses given above. From all of this two things are clear: One is that there has been a marvelous, a revolutionary, advance in the machining of metals; the other is that steel makers have met the demand remarkably.

It is also clear that we do not know yet where we are and there is much to be learned by everybody. The best methods of hardening may not have been found; it seems that for very high speed work it is necessary to fairly melt the point of a tool and quench it in a strong air blast, and then grind to shape. This would not do for threading dies, milling cutters, &c., for the heat would destroy the tools.

Such tools are finished from annealed bars; this high speed steel can be annealed as nicely as carbon steel, differing in this respect from air hardening steel.

The finished tools are heated in a lead bath of 1800 degrees to 2000 degrees, and are quenched quickly in ordinary tempering oil, which must be kept cool by a coil containing circulating cold water; they are then tempered in a bath of heavy oil heated to about 450 degrees. The tools come out bright and clean and do their work wonderfully well.

### What the Steel Maker Must Learn.

The steel maker has the most to learn. He must find out why there is such a great difference in the work the steel will do, when there is so little difference in composition. He must find the composition or mixture that will come nearest to meeting all the requirements. He has at his command now ferromanganese, ferrosilicon,

ferrochromium, ferrotungsten, ferromolybdenum, ferrovanadium and ferrotitanium. These alloys are all expensive, except the first two, costing from 60 cents to \$12 a pound, therefore the present prices of high speed steel, which to some people seem to be of the fancy order, are really not excessive.

As far as we know at present, the steel users have not succeeded in making tools that are satisfactory for finishing, and for this purpose they resort to tools of carbon steel, after having done the rougher, heavier work with high speed steel. This difficulty may be overcome by proper methods of hardening and tempering, or the steel makers may find a composition that will make a tool that is as good for finishing as for roughing.

The successful production of the above named alloys marks a great advance in metallurgy, and, now that a demand has sprung up, it is certain that the supply will follow, with certainty and uniformity of composition and reductions of cost.

The making and the utilizing of steel containing practically only carbon and iron, with some modifications made by the use of small quantities of manganese, silicon, tungsten and nickel, have occupied the best minds in the manufacturing and engineering world for many years. The last half of the nineteenth century saw most wonderful developments produced by the inventions of Bessemer and Siemens, aided by the skill and energy of the brightest engineering minds. At the close of the century it was customary to "point with pride," and to assume that so much had been done and so much was known that there was no room for more revolutionary changes, and the coming generation had only to tag along, utilizing these great advances with ease and comfort to themselves and with blessings upon their predecessors.

Now, in the first five years of the twentieth century, we older men find ourselves standing on our heads once more. A revolution has come already, and we can look forward to a splendid opening for the exercise of the best energy and thought of the succeeding generation.

We enjoyed the struggle and the gains of our time, and we can rejoice with the younger men in the prospects of the great triumphs that are to come for them. Clearly, there is still plenty to do and plenty to learn, and in the doing of them there will be great pleasure.

### An Important Anti-Boycott Victory.

The American Anti-Boycott Association has won another important victory in the Danbury (Conn.) hat cases. The United States Circuit Court for the district of Connecticut has decided against the defendants in the suit of D. E. Loewe & Co. of Danbury vs. the United Hatters of North America and the American Federation of Labor and 250 individual members of those organizations, who contended that as the suit had been brought in the courts of Connecticut suit could not properly be brought also in the United States Court. The Superior Court of Connecticut had already decided a similar contention of the defendants, who claimed that as the suit had been brought in the United States Court it could not properly be brought in the State courts, the finding being that the suit could properly be brought in the State courts. As the matter now stands, both the suit in the State Court and that in the United States Court are in good standing. In other words, the courts have decided that D. E. Loewe & Co. can properly sue under the State law to recover damages resulting from a boycott by the defendants, and may also sue for damages in the United States Court under the Sherman Anti-Trust act. These are the cases where the property of a large number of individual members of the union, both real estate and bank accounts, has been attached.

J. L. Perkins & Co., dealers in galvanized sheets and other iron products, Chicago, made an assignment June 13, the Royal Trust Company being appointed receivers. Last December the same firm were embarrassed and the same receivers were appointed, but a settlement was made with the creditors and the receivers were discharged.

### The New Brown & Sharpe Vertical Spindle Milling Attachment.

The occasions when a vertical spindle milling device are desirable and advantageous are numerous, and the increased capability of the ordinary horizontal milling machine, when provided with such an attachment, is remarkable. By its use a wide range of drilling, spiral milling, milling of angular slots in surfaces at any angle, T-slots, keyways and work requiring operations of a similar character become possible. The attachment shown herewith, recently brought out by the Brown & Sharpe Mfg. Company, Providence, R. I., is known as the No. 20 compound vertical spindle milling attachment, and is applicable for use on Nos. 1, 1½, 2 and 2-A universal and Nos. 1, 1-B, 2 and 2-B plain milling machines, as made by this concern.

The attachment is rigidly held in position by clamping its upper part or head to the overhanging arm of the machine, and the lower part to the face of the column by means of a heavy bracket. Figs. 1 and 2 indicate the many positions in which the device may be used. When mounted as shown in Fig. 1 the spindle may be inclined at any angle in a plane parallel with the face of the column. In Fig. 2 it is shown turned through an angle of 90 degrees, so that various angles of the spindle may be secured in a plane perpendicular to the face of the column. These two general positions are secured, as shown, by using one or the other of the two ways of clamping the head of the attachment to the overhanging arm. The bracket is attached by bolts in T-slots at right angles on the under part of the attachment.

Naturally it is necessary to have two means of connecting to the spindle of the machine. These may be seen in the illustrations. The connection is made by in-

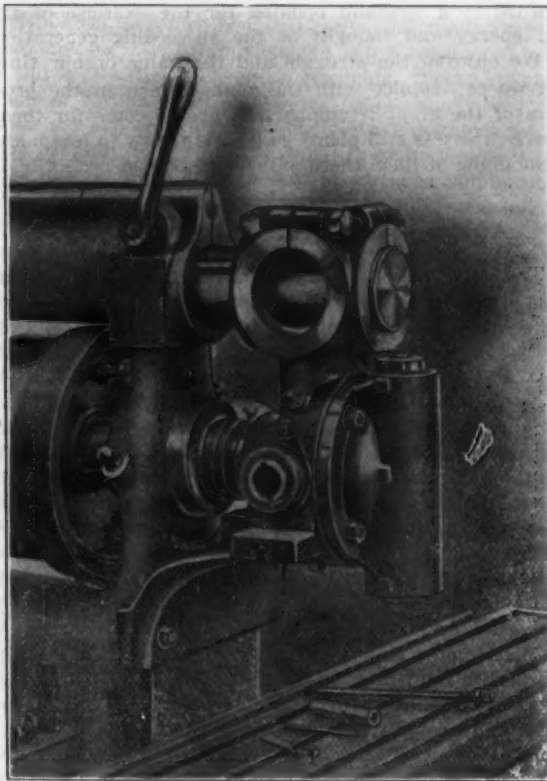


Fig. 1.—Showing Attachment in Position for Setting Spindle at Any Angle in Plane Parallel to Face of Column.

serting a horizontal tapered shaft in the main spindle of the machine, much as the ordinary cutter mandrel is inserted. This shaft by means of keys engages either of two quill shafts connecting through bevel gears, in the manner shown in Fig. 3 to the spindle of the attachment. The ability to turn the spindle in a plane at right angles to the table is a valuable feature in milling angular strips, table ways, &c., as by so doing the full length of the table travel is made available, and an ordinary end

mill instead of an angular cutter can be used for milling the angle. The spindle bearings are bronze, and provided with means of compensating for wear. The position of the spindle is indicated by graduations on the back of the head, reading to degrees. The spindle has a No. 7 tapered hole, and a draw-in bolt is furnished for holding the collets in the spindle.

The greatest distance which may be obtained from the center of the spindle to the face of the column is 12½

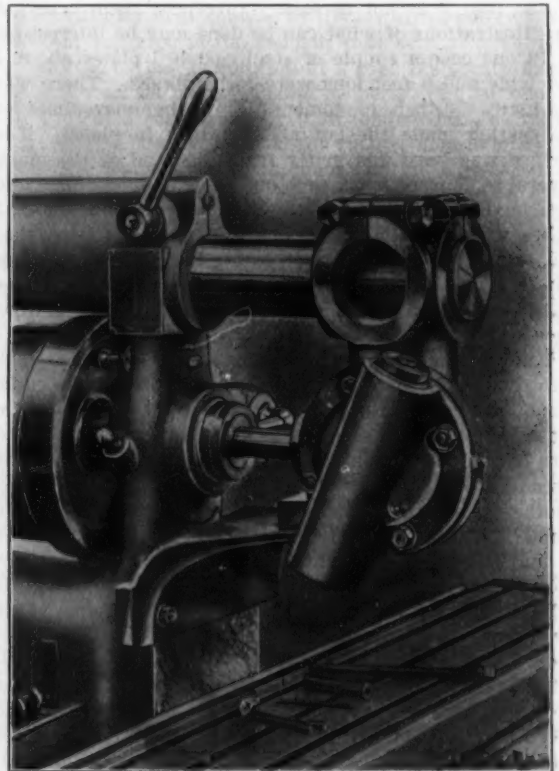


Fig. 2.—Showing Attachment in Position for Setting Spindle at Any Angle in Plane at Right Angles to Face of Column.

inches, and the least 9½ inches. On the No. 1 universal and Nos. 1 and 1-B plain milling machines speeds ranging from 100 to 592 revolutions per minute are possible; on Nos. 1½ and 2 universal and Nos. 2 and 2-B plain milling machines a range of 28 to 565 revolutions per minute is available, and on the No. 2-A universal milling machine from 27 to 608 revolutions per minute may be obtained.

**The Standard Specialty & Tube Company.**—The Standard Specialty & Tube Company have been organized at New Brighton, Pa., and are manufacturing collapsible tubes and metal specialties. The collapsible tubes are used for holding inks, cement, paste, blacking and other substances. The company are manufacturing the tubes in two grades of metal, one of these being block tin and the other their own composition of tin coated metal, for which they have adopted the brand "Standard metal." The Standard Specialty & Tube Company are an identified interest of the Pierce-Crouch Engine Company, also at New Brighton, manufacturers of gas engines.

The plant and property of the Morse Iron Works & Dry Dock Company, at the foot of Fifty-fifth street, Brooklyn, N. Y., were sold at auction June 16 to John F. Cadigan for \$50,000 over mortgage aggregating \$510,000. The property was purchased on behalf of a majority of the creditors, who are to reorganize the company and continue the business. Within the next week or ten days the new owners will meet to prepare plans for a formal organization, which will operate under a name similar to that of the Morse Iron Works & Dry Dock Company. At the present time work is being done only at the dry dock, but orders have already been given to overhaul the boilers and machinery with the intention of placing the entire plant in operation about the latter part of August.



### The Milwaukee Pumping Engine Letting Deferred.

A peculiar condition confronts the city of Milwaukee in awarding contracts for its new North Point pumping station as the result of a resolution which was put through the Common Council June 13, under a suspension of rules by the Social Democratic wing of the Council, without its being detected by the other Aldermen. The resolution provides that the printed specifications shall contain a provision that the men who do the work shall be employed no longer than eight hours a day. A call for bids had been previously made, and the bids were opened June 15, but, because of the passage of this resolution

are the home institution. According to law, the contract would have to be awarded to the Tod Company, represented by Irving P. Reynolds, formerly with the Allis-Chalmers Company. Edwin Reynolds, consulting engineer, personally appeared for the Allis-Chalmers Company, and stated that the normal price for a pumping engine such as is called for by the specifications is \$100,000, but that the present slack condition of business and the aim of the Allis-Chalmers Company to give employment to as many men as possible, together with their local pride, induced them to submit such a low bid. It is announced that the attorneys for the different companies making bids will fight the constitutionality of the resolution requiring that only companies operating under the eight-hour day shall be considered in making the contract. It is probable that when the bids are presented under the new advertisement, and with the new requirement, legal proceedings will be commenced to prevent the award of the contract. The bids presented were as follows:

|  |           |
|--|-----------|
| Kilby Mfg. Company, Cleveland, Ohio.....       | \$115,000 |
| Filer & Stowell Company.....                   | 70,000    |
| William Tod Company, Youngstown, Ohio (a)..... | 64,400    |
| William Tod Company (b).....                   | 69,500    |
| Holly Mfg. Company, Buffalo, N. Y.....         | 127,500   |
| Allis-Chalmers Company (a).....                | 65,000    |
| Allis-Chalmers Company (b).....                | 95,000    |
| Allis-Chalmers Company (c).....                | 85,000    |
| Allis-Chalmers Company (d).....                | 83,000    |

### Proposed European Rail Agreement.

LONDON, June 11, 1904.—News to hand this morning indicates that negotiations have been proceeding for some weeks between the British and Continental rail makers to mitigate, if not actually to preclude, international competition between European mills in export business. It certainly would appear that the German Steel Syndicate are very much alive to the difficulties of excessive competition, and they have left no stone unturned to reach agreements with competitors. The *Ironmonger* in to-day's issue states that the following figures are accepted by all parties as being approximately correct as the actual steel rail production of the countries concerned: Great Britain, 1,003,000 tons; German, 1,008,000 tons; Belgium, 200,000 tons. The same journal adds that under the new arrangement the export business will be apportioned as follows: Great Britain, 53½ per cent.; German and Belgium, 46½ per cent. The *Liège* correspondent of the *Iron and Coal Trades Review* states, however, that the apportionment of the British rail makers is to be 56 per cent. of the export trade of the world, and that of Germany and Belgium combined 44 per cent. In round figures the exports of rails and accessories during 1903 were as follows: Great Britain, 728,000 tons; Germany, 450,000 tons; Belgium, 268,000 tons. It will be observed that the export trade in rails bears a close proportion to the total output of the various countries named.

It is recognized by all authorities concerned that the proposed agreement is largely dependent for its success upon the possibilities of the American export trade. Unless the German Steel Syndicate have come to some understanding unknown to the outside world with the United States Steel Corporation, it is quite evident that any increase in the American export trade would nullify the proposed European agreement. There is one other slight omission, perhaps of little consequence. A limited number of French firms roll rails for the French market and for the French colonial market, but France is altogether so self contained in its general commercial operations that probably this would hardly count.

S. G. H.

The Merchants' and Manufacturers' Association of Milwaukee, headed by its president, Frederick W. Slyyer, president of the Northwestern Malleable Iron Works, conducted its fourth annual excursion to interior cities in the State of Wisconsin during the week of June 13-18. Seventy-five members of the association accompanied the excursion, and the itinerary included leading cities directly north of Milwaukee and in the Wisconsin River valley. The trip was taken for the purpose of attracting trade to the city of Milwaukee.

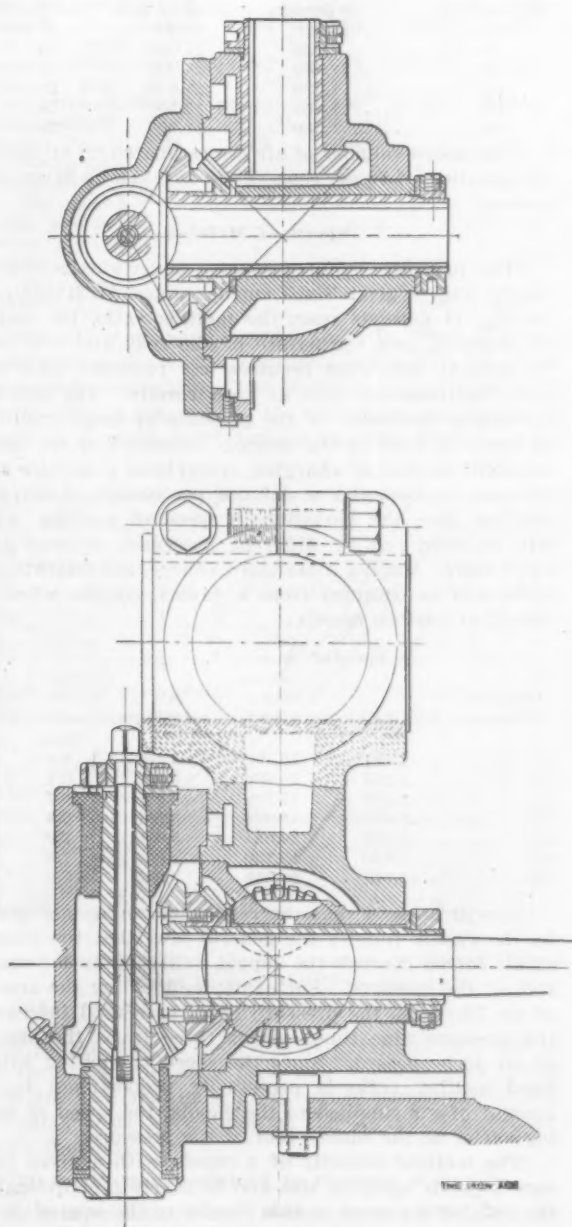


Fig. 3.—Vertical Section and Plan Section of the Brown & Sharpe Vertical Spindle Milling Attachment.

and awaiting its signature or disapproval by the Mayor, the contracts were not awarded. On the following Friday the Mayor signed the resolution, which will make it necessary to readvertise for bids. To make the situation more complex, there has been great rivalry among competing companies for the contract which called for a pump having a capacity of 20,000,000 gallons in 24 hours.

When the bids were opened, there was great surprise manifested at their great range, from \$64,400 by the William Tod Company, Youngstown, Ohio, to \$127,500 by the Holly Mfg. Company, Buffalo, N. Y. There was a difference of but \$600 between the bid of the Wm. Tod Company and that of the Allis-Chalmers Company, who

### Cupola Fan Practice.\*

The object of this paper is to give reliable data relative to the operation of centrifugal blowers for cupola service, including the air supply required per pound of coke used and per ton of iron produced; the relation of pressure, size of cupola and speed of melting; the horsepower required for various sizes of cupolas at different pressures, corresponding to different ratios of melting; the relation of speed, pressure and capacity of centrifugal cupola blowers; the effect of piping resistance upon the pressure and horse-power.

Considerable time has recently been spent in securing new data and many previous tests have been reconducted, in view of a more accurate determination.

#### Air Supply.

The air required per ton of iron melted has been variously given from 30,000 to 33,000 cubic feet. As it is almost impossible to measure the air directly, it is necessary to resort to an indirect method, such as chemical analysis of the escaping gases. By analyzing a sufficient number of samples, the amount of air used in the combustion of the coke can be determined with considerable exactness. This also serves to show the nature of the gases produced. Below are given the results of several analyses:

| Sample.     | Pressure<br>in<br>ounces. | CO <sub>2</sub><br>Per ct. | CO<br>Per ct. | O.<br>Per ct. | N.<br>Per ct. | Air<br>per<br>pound<br>carbon. | Air<br>per<br>pound<br>coke. | B. T. U.<br>per<br>pound. |
|-------------|---------------------------|----------------------------|---------------|---------------|---------------|--------------------------------|------------------------------|---------------------------|
| 1.....14    | 11.0                      | 10.0                       | 0.6           | 78.4          | 9.15          | 8.1                            | 8,530                        |                           |
| 2.....14    | 11.0                      | 10.5                       | 2.1           | 75.8          | 9.95          | 8.8                            | 8,540                        |                           |
| 3.....14    | 13.4                      | 10.4                       | 0.3           | 95.9          | 9.3           | 8.2                            | 8,800                        |                           |
| 4.....14    | 11.0                      | 14.3                       | 0.5           | 74.2          | 8.83          | 7.8                            | 7,750                        |                           |
| 5.....16½   | 10.5                      | 10.4                       | 0.8           | ...           | ...           | ...                            | ...                          |                           |
| 6.....16½   | 10.5                      | 10.4                       | 0.8           | 78.3          | 9.15          | 8.24                           | 9,420                        |                           |
| 7.....16½   | 12.3                      | 10.7                       | 0.9           | 71.0          | 9.34          | 8.4                            | 9,800                        |                           |
| 8.....16½   | 12.4                      | 10.6                       | 0.3           | 76.3          | 9.07          | 8.16                           | 9,960                        |                           |
| 9.....16½   | 11.2                      | 11.9                       | 0.4           | 76.5          | 8.4           | 7.55                           | 9,300                        |                           |
| 10.....16½  | 12.0                      | 15.0                       | 1.0           | 72.0          | 8.57          | 7.7                            | 8,850                        |                           |
| Average ... | ...                       | ...                        | ...           | ...           | 8.9           | 8.00                           | 9,466                        |                           |
| 11.....9    | 15.0                      | 8.8                        | 0.4           | 75.8          | 9.5           | 8.55                           | 10,700                       |                           |
| 12.....9    | 12.9                      | 10.5                       | 0.4           | 80.2          | 8.85          | 7.96                           | 10,500                       |                           |
| 13.....9    | 17.5                      | 6.7                        | 0.1           | 75.7          | 9.87          | 8.80                           | 11,630                       |                           |
| 14.....9    | 9.3                       | 12.2                       | 0.4           | 78.1          | 8.7           | 7.83                           | 8,725                        |                           |
| Average ... | ...                       | ...                        | ...           | ...           | 9.23          | 8.31                           | 10,394                       |                           |

Nos. 1 to 4 are from a cupola, 44 inches in diameter inside lining, operated by Buffalo steel pressure blowers at 14 ounces pressure. Nos. 5 to 10 are from a 60-inch Whiting cupola operated at 16½ ounces pressure by a positive blower. Nos. 11 to 14 are from a center blast cupola at the plant of Thomas D. West Foundry Company. This cupola is of Whiting make, measures 74 inches in diameter inside lining, and was operated by a No. 12 Buffalo blower at 9 ounces.

It will be noted that an average of about 9 pounds of air is required per pound of carbon, and 8.1 pounds of air per pound of coke, with coke containing about 90 per cent. carbon. Also that in the most of the samples only about 50 per cent. of the carbon is burned to carbon dioxide, and the rest to carbon monoxide, liberating only one-third of its total heating value. One pound of carbon burned to carbon dioxide requires practically 12 pounds of air; the same burned to carbon monoxide requires only 6 pounds of air. In the first process 14,450 heat units are liberated, while in the second only 4400. Therefore, in the present cupola practice less air is required than that necessary for perfect combustion, and only about two-thirds of the total heating value of the fuel is utilized, the remaining one-third escaping in the unburned carbon monoxide gas. The deeper and more intense the fire the greater seems to be the percentage of carbon monoxide gas produced. In blast furnace practice this gas is present in quantities sufficient to make the gases highly valuable as fuel, either in the production of steam or for use in gas engines.

While somewhat foreign to the general purpose of this paper, it may be remarked that there is an opportunity for effecting considerable saving in fuel and a consequent increase in the melting ratio by devising some

means whereby a more perfect combustion may be secured. The above test, so far as conducted, would indicate that the center blast tuyere, first proposed and tried by Thomas D. West, is a step in the right direction. The samples of gases taken from this cupola, except the last, show a much more perfect combustion than the ordinary side blast cupola.

From the preceding it appears that the amount of air required per ton of iron depends upon and varies with the melting ratio. The following weights and volumes of air are required per ton of iron for different melting ratios:

| Melting ratio. | By analysis.             |                              | Perfect combustion of air in cubic feet. |
|----------------|--------------------------|------------------------------|--|
|                | Weight of air in pounds. | Volume of air in cubic feet. |  |
| 7.....         | 2,320                    | 31,000                       | 41,400                                   |
| 8.....         | 2,020                    | 27,000                       | 36,000                                   |
| 9.....         | 1,800                    | 24,000                       | 32,000                                   |
| 10.....        | 1,620                    | 21,600                       | 28,000                                   |
| 11.....        | 1,470                    | 19,500                       | 26,200                                   |
| 12.....        | 1,350                    | 18,000                       | 24,000                                   |

The above volumes of air are estimated on an average temperature of 70 per cent. Coke is taken as 90 per cent. carbon.

#### Speed of Melting.

The pressure required to give a certain melting capacity with a given sized cupola cannot be stated absolutely. It depends upon the melting ratio, the method of charging, and the nature of the coke and iron used. In general, soft coke requires less pressure than hard coke, but does not give as good results. The speed of melting is decreased by the presence of large quantities of scrap or steel in the charge. However, if we take a standard method of charging, comprising a definite ratio of coke to iron and a definite percentage of scrap of uniform size, the variation in speed of melting which will be produced by different pressures follows quite exact laws. Taking a standard charge, the following results will be obtained from a 44-inch cupola, when operated at various speeds:

| Pressure.<br>in ounces. | Speed of fan. |                                    | Air<br>per minute. | Estimated<br>melting capacity.<br>Tons. | Horse-<br>power |
|-------------------------|---------------|------------------------------------|--------------------|---|-----------------|
|                         | R. P. M.      | Peripheral.<br>Feet<br>per minute. |                    |   |                 |
| 10.....                 | 2,151         | 16,193                             | 3,100              | 6.0                                     | 16              |
| 11.....                 | 2,254         | 16,966                             | 3,250              | 6.4                                     | 18              |
| 12.....                 | 2,352         | 17,702                             | 3,400              | 6.7                                     | 21              |
| 13.....                 | 2,450         | 18,406                             | 3,540              | 6.9                                     | 23              |
| 14.....                 | 2,535         | 19,081                             | 3,670              | 7.2                                     | 26              |
| 15.....                 | 2,620         | 19,730                             | 3,800              | 7.5                                     | 29              |
| 16.....                 | 2,705         | 20,358                             | 3,920              | 7.8                                     | 32              |

It will be seen that the resistance to the air offered by the cupola follows the general law, that the amount of air forced through the cupola will vary as the square root of the pressure. For example, doubling the amount of air increases the pressure four times, and increasing the pressure nine times allows three times the amount of air to be passed. Since the speed of melting with a fixed melting ratio is necessarily proportional to the amount of air supplied to the cupola, the speed of melting varies as the square root of the pressure.

The melting capacity of a cupola with a given pressure depends upon its size and is nearly proportional to the area of the cross section; hence to the square of the diameter inside the lining. This will not hold exactly with the ordinary side blast tuyere, as somewhat larger pressure is required with the large sizes of cupolas to force the air to the center of the charge. As a result of a number of tests the following formula is determined for the average speed of melting:

$$W = 2D^2 \sqrt{p},$$

where  $W$  is the weight of iron in pounds per hour,  $D$  the diameter of the cupola inside lining, in inches, and  $p$  pressure at the cupola in ounces per square inch.

This formula holds accurately for melting ratios of 10 to 1 with good hard coke and charges containing but little scrap. The air per minute required for various sizes of cupolas may be obtained by the formula:

$$C = \frac{D^2 \times \sqrt{p}}{2},$$

where  $C$  is the cubic feet of air per minute required, and  $D$  and  $p$  as before. This is a safe factor for ordinary

\* Abstract of a paper read by W. H. Carrier of Buffalo, N. Y., before the American Foundrymen's Association at Indianapolis, Ind., June 7, 1904.



use and gives an allowance of about 10 per cent. for leakage, &c.

Below are given several tests which show the results obtained under different conditions:

|                                     | Test I. | Test II. | Test III. | Test IV. | Test V. |
|-------------------------------------|---------|----------|-----------|----------|---------|
| Diameter of cupola, inches...       | 44      | 44       | 74        | 60       | 60      |
| Duration of heat, minutes .....     | 82      | 80       | 157       | 170      | 134     |
| Average pressure, ounces .....      | 16.43   | 12.87    | 8.68      | 13.5     | 16.18   |
| Coke, pounds, total .....           | 2,500   | 2,500    | 5,500     | 9,000    | 8,400   |
| Iron, pounds.....                   | 20,000  | 20,000   | 68,000    | 70,000   | 66,000  |
| Melting ratio... 8 to 1             | 8 to 1  | 8 to 1   | 12.2 to 1 | 8 to 1   | 8 to 1  |
| Coke per hour, pounds .....         | 1,830   | 1,686    | 2,120     | 3,180    | 3,760   |
| Iron per hour, pounds, actual.....  | 14,600  | 13,487   | 26,000    | 24,700   | 29,500  |
| Iron per hour, pounds, formula..... | 15,700  | 13,823   | 32,200    | 28,350   | 28,950  |
| Horse-power, actual .....           | 32      | 24       | 39.7      | ....     | ....    |
| Horse-power, formula .....          | 33.6    | 23.13    | 36.3      | ....     | ....    |
| Air per pound coke, pounds..        | 8.22    | 8        | 8.31      | 8        | 8       |
| Air per minute, actual .....        | ....    | ....     | ....      | 5,680    | 6,673   |
| Air per minute, formula .....       | ....    | ....     | ....      | 7,088    | 7,238   |

Test III was made at the Thos. D. West Foundry under very unfavorable conditions. However, the melting ratio was excellent. The heat was exceedingly small for the size of the cupola; the iron consisted largely of big pieces of scrap which had accumulated for some time,

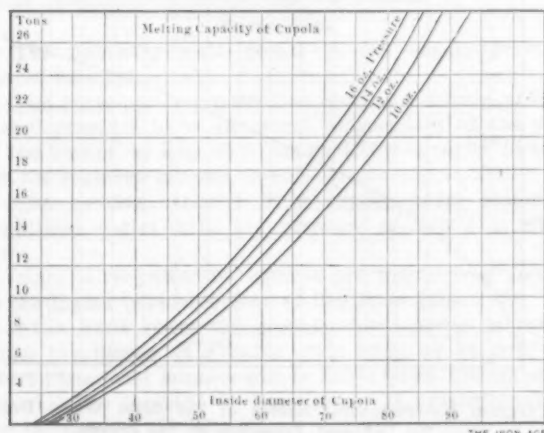


Diagram I.—Relation of Melting Capacity to Size of Cupola Under Various Air Pressures.

many pieces being of such size as to require two men to lift them, and the coke used was unusually poor, being quite fine and containing an excessive percentage of ash. The other tests were made at the Buffalo Forge Company's foundry.

#### Horse-Power Required to Operate a Cupola.

It is usually considered that a certain sized fan, operating at a certain pressure, will require a certain horse-power. This is the usual method of rating given by makers and holds very well when the fans are delivering the amount of air specified at the given pressure, but it is inaccurate when applied to cupolas in ordinary practice, since the amount of air which the blower will handle is limited by the size of the cupola, and the horse-power required to operate the fan, as will be shown later, is dependent upon the amount of air which it is allowed to handle.

Each cubic foot of air per minute moved against a pressure of 1 ounce per square inch, or 9 pounds per square foot, represents the expenditure of 0.000272 horse-power—i.e., with perfect efficiency, 37,000 cubic feet of air per minute moved against 1 ounce pressure will require 1 horse-power. A well constructed fan will give a maximum efficiency of about 60 per cent., therefore, will require 0.00045 horse-power per cubic foot of air per minute per ounce pressure. The horse-power required

for any sized cupola at any pressure is given by the formula:

$$H.P. = \frac{D^2 \sqrt{p}}{3800}$$

where  $D$  is the diameter of cupola inside of lining in inches, and  $p$  the pressure at the cupola in ounces per square inch.

The following table shows the melting capacity in

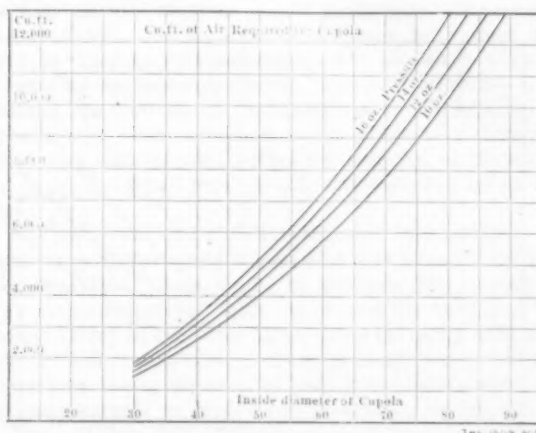


Diagram II.—Relation of Air Required to Size of Cupola Under Various Air Pressures.

tons, air per minute required, and horse-power to drive the fan for various sizes of cupolas and for pressures from 10 to 16 ounces. The horse-power given is the actual brake horse-power, and the pressures are those actually obtained at the cupola. If the fan is provided with the horse-power motor specified, and the cupola is properly managed, no trouble will be experienced from overloading. More power is required for a short time at the beginning and at the end of the heat, due to the decreased resistance at these times, but it does not last long enough to cause undue heating of the motor. If the fan delivers air too freely at these times the blast gates should be used to prevent overload.

Table No. 1.—Cupola Capacities.

| Static Pressure at Cupola in Ounces Per Square Inch. |                     |         |         |         |         |
|--|---------------------|---------|---------|---------|---------|
| Diameter cupola, inches.                             |                     | 10      | 12      | 14      | 16      |
|  |                     | ounces. | ounces. | ounces. | ounces. |
| 30   | Capacity .....      | 5,690   | 6,230   | 6,790   | 7,200   |
|  | Air per minute..... | 1,423   | 1,568   | 1,688   | 1,800   |
|  | Horse-power .....   | 7.4     | 9.7     | 12.3    | 15.0    |
| 35   | Capacity .....      | 7,740   | 8,480   | 9,170   | 9,800   |
|  | Air per minute..... | 1,935   | 2,120   | 2,293   | 2,450   |
|  | Horse-power .....   | 10.0    | 13.2    | 16.7    | 20.4    |
| 40   | Capacity .....      | 10,120  | 11,080  | 11,970  | 12,800  |
|  | Air per minute..... | 2,530   | 2,770   | 2,993   | 3,200   |
|  | Horse-power .....   | 13.2    | 17.8    | 21.8    | 26.6    |
| 45   | Capacity .....      | 12,810  | 14,030  | 15,150  | 16,200  |
|  | Air per minute..... | 3,203   | 3,508   | 3,788   | 4,050   |
|  | Horse-power .....   | 16.7    | 21.9    | 27.6    | 33.7    |
| 50   | Capacity .....      | 15,810  | 17,320  | 18,700  | 20,000  |
|  | Air per minute..... | 3,953   | 4,330   | 4,675   | 5,000   |
|  | Horse-power .....   | 20.6    | 27.0    | 34.0    | 41.6    |
| 55   | Capacity .....      | 19,130  | 20,960  | 22,640  | 24,200  |
|  | Air per minute..... | 4,783   | 5,240   | 5,660   | 6,050   |
|  | Horse-power .....   | 24.9    | 32.7    | 41.2    | 50.3    |
| 60   | Capacity .....      | 22,770  | 24,940  | 26,940  | 28,800  |
|  | Air per minute..... | 5,693   | 6,235   | 6,735   | 7,200   |
|  | Horse-power .....   | 29.6    | 38.9    | 49.0    | 59.9    |
| 65   | Capacity .....      | 26,730  | 29,270  | 31,620  | 33,800  |
|  | Air per minute..... | 6,683   | 7,318   | 7,905   | 8,450   |
|  | Horse-power .....   | 34.8    | 45.7    | 57.5    | 70.3    |
| 70   | Capacity .....      | 30,990  | 33,950  | 36,670  | 39,200  |
|  | Air per minute..... | 7,748   | 8,488   | 9,168   | 9,800   |
|  | Horse-power .....   | 40.3    | 52.9    | 66.7    | 81.5    |
| 75   | Capacity .....      | 35,580  | 38,970  | 42,090  | 45,000  |
|  | Air per minute..... | 8,895   | 9,743   | 10,523  | 11,250  |
|  | Horse-power .....   | 46.3    | 60.8    | 76.6    | 93.6    |
| 80   | Capacity .....      | 40,480  | 44,340  | 47,890  | 51,200  |
|  | Air per minute..... | 10,120  | 11,085  | 11,973  | 12,800  |
|  | Horse-power .....   | 52.6    | 69.2    | 87.2    | 106.5   |

Diagrams I, II and III show graphically the results given in Table 1, and may be used for sizes of cupolas and for pressures between those given in table.

#### Performance of Centrifugal Blower.

The statement has already been made that the air delivery and horse-power of centrifugal blowers at a given pressure depend upon the size of the cupola to which it is applied. In this respect the centrifugal blower differs from the positive pressure blower. With

the latter, as the resistance is increased, either by increasing the speed of the blower or applying it to a smaller cupola, the pressure and horse-power are both increased in proportion. With the centrifugal blower the effect upon the horse-power is reversed. An increase of resistance increases the pressure, as in the positive blower, but the capacity and horse-power are both decreased. If the resistance against which the centrifugal blower is working is decreased, by putting on a lighter charge or applying to a larger size cupola, the pressure

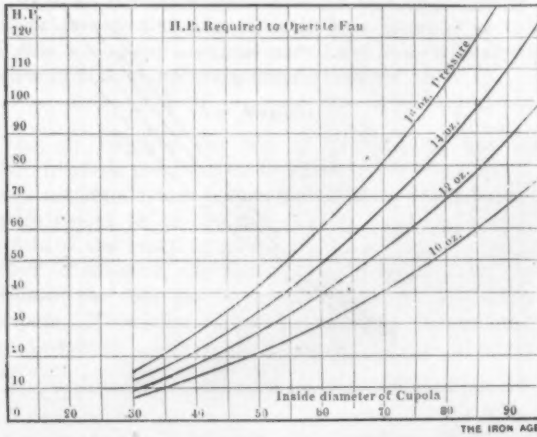


Diagram III.—Relation of Horse-Power Required to Drive Fan to Size of Cupola Under Various Air Pressures.

is decreased to some extent, and the capacity and horse-power are increased. For this reason the centrifugal blower offers some advantages over the positive blower, which, though positive in action, is limited in capacity and cannot adjust itself to the variations in demand for air, nor can its capacity and pressure be readily controlled by the operation of a blast gate. Flexibility of operation is secured with the centrifugal fan, since its pressure increases and decreases with the increase and decrease of resistance; the volume supplied varies with the conditions of pressure, and at any time all of the air is supplied which the condition of the cupola will admit. This flexibility often makes the melting capacity of the cupola with a fan blower considerably greater than with a positive blower, owing to the fact that an increased quantity of air can be supplied when required. Another advantage of the centrifugal blower is that the same size

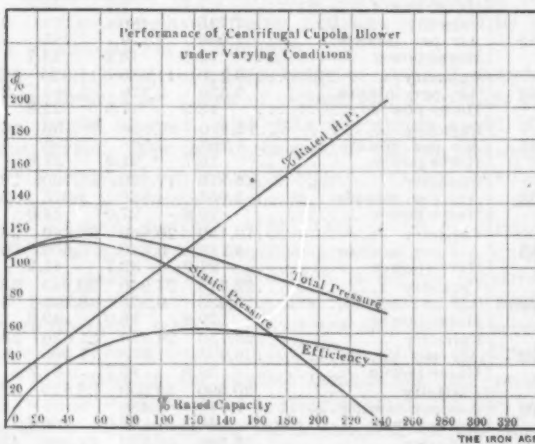


Diagram IV.—Performance of Centrifugal Blower Under Varying Conditions.

can be applied to several sizes of cupolas without altering the speed, and without greatly affecting the efficiency of the blower.

As a basis for comparison of the operation of a centrifugal blower under various conditions, Table 2 gives the pressures produced and the horse-power required for a steel pressure blower operating at a constant speed of 1960 revolutions and handling various quantities of air from zero to maximum capacity at free delivery. Table 3 gives the same results in terms of capacity, pressure

and horse-power at rated capacity. These tables are self explanatory. It will be seen the horse-power required when running open is about twice that required when operating at rated capacity, and that when running closed it is only 28 per cent. of that required at rated capacity, or 14 per cent. of the horse power required at free delivery; also that the increase in horse-power is proportional to the increase in capacity. The pressure increases from free delivery up to about 60 per cent. of the rated capacity, and decreases up to the point where the outlet is entirely closed. The rated capacity of the blower is based upon the capacity and pressure at which it will operate most economically. This is shown in the column marked "Per cent. efficiency;" these results are also shown graphically in Diagram IV:

Table No. 2.—Performances of No. 11 Centrifugal Cupola Blower at 1960 Revolutions Per Minute

| Capacity. | Pressure. |        | Horse-power. |
|-----------|-----------|--------|--------------|
|           | Static.   | Total. |              |
| 0         | 12.35     | 12.35  | 12.25        |
| 392       | 13.55     | 13.7   | 18.38        |
| 735       | 13.9      | 14.28  | 24.93        |
| 1,178     | 13.8      | 14.4   | 31.45        |
| 1,570     | 13.2      | 14.28  | 37.6         |
| 1,960     | 12.35     | 13.8   | 43.73        |
| 2,355     | 11.04     | 13.08  | 50.7         |
| 2,748     | 9.6       | 12.35  | 56.8         |
| 3,140     | 7.91      | 11.64  | 63           |
| 3,530     | 6.12      | 10.91  | 69.5         |
| 3,920     | 4.32      | 10.2   | 75.6         |
| 2,320     | 2.38      | 9.475  | 81.75        |
| 4,790*    | 0         | 8.7    | 88.3         |

\* Free delivery.

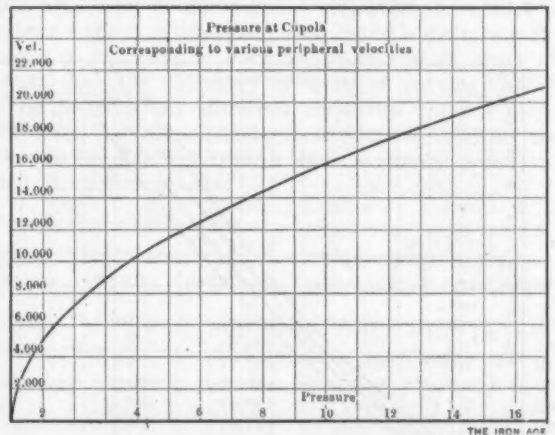


Diagram V.—Peripheral Speeds of the Blast Wheel Required for Different Pressures at the Cupola.

Table No. 3.—Performance of Centrifugal Cupola Blower Under Varying Conditions.

| Per cent. rated capacity. | Per cent. static pressure. | Per cent. rated pressure. | Per cent. rated horse-power. | Per cent. efficiency. |
|---------------------------|----------------------------|---------------------------|------------------------------|-----------------------|
| 0                         | 103                        | 103                       | 28                           | 0                     |
| 20                        | 113                        | 114                       | 42                           | 27.6                  |
| 40                        | 116                        | 119                       | 57                           | 40.8                  |
| 60                        | 115                        | 120                       | 72                           | 50.4                  |
| 80                        | 110                        | 119                       | 86                           | 56.4                  |
| 100                       | 103                        | 115                       | 100                          | 60                    |
| 120                       | 92                         | 109                       | 116                          | 61.8                  |
| 140                       | 80                         | 103                       | 130                          | 61.7                  |
| 160                       | 66                         | 97                        | 144                          | 58.8                  |
| 180                       | 51                         | 91                        | 159                          | 56.4                  |
| 200                       | 36                         | 85                        | 173                          | 52.8                  |
| 220                       | 19                         | 79                        | 187                          | 49.2                  |
| 244*                      | 0                          | 72½                       | 202                          | 45.0                  |

\* Free delivery.

As has been shown, the capacity under any condition is proportional to the speed of the fan, and the pressure is proportional to the square of the speed. From this it follows that the horse-power required to drive the fan will vary as the cube of the speed; for instance, suppose that a blower, operating at 1800 revolutions per minute, requires 25 horse-power when attached to a certain cupola. Now if the speed is increased from 1800 to 1980, or 10 per cent., the horse-power will be increased to  $1.10 \times 1.10 \times 1.10 = 1.33$  times, or an increase of 33 per cent. in horse-power, which will make the horse-power at 1980 revolutions 33.3. Also, if a blower gives 10 ounces pressure at 1800 revolutions per minute when



applied to a certain cupola, it will give  $1.10 \times 1.10 = 1.21$  times that pressure for an increase of 10 per cent. in speed—that is, at the speed of 1980 revolutions the pressure will be 12.1 ounces.

Table 4 and Diagram V show the various peripheral speeds of the blast wheel required for different pressures at the cupola. For example: Supposing it is required to find the speed of a blower  $34\frac{1}{2}$  inches in diameter, to give 14 ounces pressure at the cupola. Since the diameter is  $34\frac{1}{2}$  inches, the periphery of the wheel will be  $3.14 \times 34\frac{1}{2}$  inches  $\div 12 = 9.02$  feet. From the table we find that the peripheral speed required is 19,081 feet per minute. Revolutions per minute of the fan will, therefore, be  $19,081 \div 9.02 = 2113$  revolutions per minute.

Table No. 4.—Peripheral Velocities Required for Various Pressures at Cupola.

| Pressure.<br>Ounces. | Peripheral<br>velocity. | Pressure.<br>Ounces. | Peripheral<br>velocity. |
|----------------------|-------------------------|----------------------|-------------------------|
| 8.....               | 14,514                  | 13.....              | 18,406                  |
| 9.....               | 15,378                  | 14.....              | 19,081                  |
| 10.....              | 16,193                  | 15.....              | 19,731                  |
| 11.....              | 16,966                  | 16.....              | 20,358                  |
| 12.....              | 17,702                  |                      |                         |

#### Effect of Piping Resistance.

The piping connections from blower to cupola affect considerably the results secured. With a short, straight pipe the pressure at the cupola will be practically the same as at the fan outlet. If, however, the connection is long and has a number of sharp bends the pressure may be reduced several ounces. If the speed of the fan is not increased the horse-power will be decreased by this resistance, but the melting capacity of the cupola will also be decreased. The pressure at the fan outlet will be slightly increased by the extra resistance offered by the fan. If, however, the fan is speeded up to secure the desired pressure at the cupola a considerably increased horse-power will be required to overcome the extra resistance of the piping.

#### Summary.

The following main points in fan cupola practice should be emphasized:

The horse-power required to operate a cupola at any stated pressure is to an extent independent of the size of the blower, so long as it has sufficient capacity to supply the required amount of air.

The melting capacity of a cupola under standard conditions varies with the pressure according to fixed laws.

More horse-power is required per ton of iron melted at the higher pressures than at the lower ones.

At a fixed speed the greatest horse-power is taken when the blower is running wide open, or at free delivery; the least horse-power is taken when the outlet is closed. The increase in horse-power is proportional to the increase in air delivery.

The piping resistance decreases the air delivery and decreases the horse-power at a fixed speed, but increases the horse-power when the fan is speeded up to give the same pressure at the cupola.

The centrifugal blower presents some advantages over the positive blower, from the fact that better results can be secured at lower pressures, but there is a greater uniformity of blast pressure, and it offers a flexibility in regulation. With the exception of the belting, there is but little wear or deterioration; it will give as high efficiency after running 20 years as when first installed. On the other hand, the positive blower, owing to the friction of the contact surfaces, wears and deteriorates rapidly, and its effect, while high at the beginning, decreases rapidly, owing to the leakage caused by the wearing away of the contact parts.

#### The Ferro-Alloy and Sheet Steel Strip Duties.

WASHINGTON, D. C., June 21, 1904.—The Treasury Department has decided to appeal from two recent decisions of the United States Circuit Court adverse to the Government, the facts concerning which were published in *The Iron Age* last week. The decisions relate to the proper dutiable classification of certain ferro-alloys, including ferrochrome, ferrotungsten, ferromolybdenum and ferrovanadium, which the court holds to be entitled to entry at \$4 per ton by similitude to ferroman-

ganese, and certain sheet steel in strips, as to which the court decides that additional duty cannot properly be assessed merely because the steel shows a high finish, which, according to the evidence, results from the pickling process to which the rods were subjected before being cold rolled.

The contention of the Government in the case of *United States vs. Roessler & Hasslacher Chemical Company*, that the ferro-alloys referred to are subject to a duty of 20 per cent. ad valorem as "metals, unwrought," is based chiefly on representations made by domestic manufacturers of ferrochrome that this product is not a "manufacture" as held by the Circuit Court. In view of the bearing this decision would have upon all products of metallurgy, the department proposes to contest this point as vigorously as possible, and if necessary to carry the case to the Supreme Court. The position of the Government, as well as of the American manufacturers of ferrochrome, with reference to the contention that this article is a manufacture within the meaning of the Tariff act, is set forth in a brief filed in the case, in part as follows:

"Were it the fact that ferrochrome is a product, the result of artificial combinations of the two materials, iron and chromium, there might be grounds for classifying it as a 'manufacture.' But this is not the case, and the Circuit Court in the later *Dana* case distinctly said that ferrochrome was produced from chromic ore, a natural product, by the application of heat in the blast furnace in the same manner as iron is produced from its ore.

"If pig iron is a 'manufacture' in the sense of the Tariff laws, simply because it is the result of a process of smelting, as held by Judge Lacombe, it is difficult to see what mineral or other product could not be classified as a 'manufactured' article, for there is scarcely a product of this nature anywhere found which does not need to have expended upon it some considerable labor before it can be used for any beneficial purpose. But, as we have above seen, terms in such cases must be used in their common acceptation, and it will never be contended, nor was it ever understood, that labor expended on a natural product to put into transportable or available shape or condition for ordinary commercial or industrial use, would be to 'manufacture' that product. An instance of a distinction between a 'manufacture' and a product on which labor has been expended, but which should in no sense be classified as the former, is as follows:

Chrome-steel is a manufacture, for it is the artificial combination of steel and ferrochrome, from which results a product differing from both ingredients and having entirely different qualities from either; while ferrochrome, the natural combination of iron and chromium, is not a manufacture, as, although labor has been expended upon it, it is not a product the result of artificial combinations, but is merely the natural metal, in a natural state, save that impurities have been removed.

#### The Sheet Steel Strip Case.

The position of the Government with regard to the dutiable classification of sheet steel in strips, involved in the case of the *Crucible Steel Company vs. United States*, in which an appeal has been directed, would appear to be less tenable than in the case of the ferro-alloys referred to. The evidence before the Circuit Court was clearly to the effect that the pickling of the rods from which the sheets were produced was a necessary feature of the process of cold rolling, and hence that the resulting sheets could not be held to be "brightened to a surface better than cold rolled, smoothed only." The decision of the Board of General Appraisers, reversed by the Circuit Court, upon which the department's decision to appeal is based, contains some rather curious reasoning. While conceding that it may be true that steel cannot be cold rolled without cleaning or pickling, the board holds that such cleaning or pickling necessarily advances the product to a grade superior to cold rolled. Of course, the importers in this case have never contended that it was a physical impossibility to produce sheet steel by cold rolling without cleaning or pickling, but merely that it is the uniform practice to pickle the rods before cold rolling, and hence that Congress had in mind sheet steel "smoothed only" as the result of the pickling process, and did not intend to assess additional duty thereon.

W. L. C.

## The Phelps-Dodge Copper Interests.

BY DWIGHT E. WOODBRIDGE.

The Copper Queen Consolidated Mining Company are the most important of the many enterprises conducted by the firm of Phelps, Dodge & Co. in the far Southwest. These enterprises are not confined to mining, but include commercial and transportation activities on a large scale.

After the expenditure of more than \$20,000,000, of which not far from \$10,000,000 was put into railway construction in the district, the several connected interests are producing heavily; at Bisbee from the Copper Queen, at Clifton from the Detroit, at Globe from the Old Dominion and United Globe, and at Nacozari, Sonora, from the Moctezuma. At their fine new smelter at Douglas, Ariz., built and just blown in by the Copper Queen Company, they are treating from 1500 to 1800 tons of ore daily and are making from 80 to 100 tons of copper, of which about 65 tons are from Copper Queen proper. At this smelter they treat the ores from Bisbee, concentrates from Nacozari, siliceous ores from Globe and some ores from Clifton. The production from these mines puts the company among the leading copper merchants of the world. The Copper Queen's output approximates 40,000,000 pounds per annum, that of Old Dominion will probably reach 20,000,000 pounds this year, that of Detroit is almost the same, though a trifle larger, while the Moctezuma Copper Company, in Mexico, make now about half as much. This is a total of 90,000,000 pounds, and to it, so far as merchandising is concerned, must be added the production of Calumet and Arizona, which is sold through Phelps, Dodge & Co. This will this year reach 32,000,000 pounds. Through action taken a few weeks ago in the purchase of a large block of stock in the Greene Consolidated Copper Company of Cananea, Sonora, the same interests have an important and harmonious standing in that company, whose output this year will be between 55,000,000 and 60,000,000 pounds. It is fair to presume that Phelps, Dodge & Co. will, in due time, control the sale of this copper also.

It is, perhaps, not beyond bounds to refer to the Copper Queen mine as

### The Most Important Copper Producer in America,

not because of its production, for it is exceeded by several, but on account of its tonnage in sight and prospective, the character of its ores, which are most easily reduced without flux, the percentage of copper contained in its average ores, and the completeness and adequacy of all its mining, smelting and transportation arrangements. This mine has been a producer since 1880, the first copper having been made on August 15 of that year. Development work has been steadily prosecuted, and the tonnage of ore in sight has annually increased, though on account of inadequate smelting facilities the production of copper has not grown since 1900. For the past 12 months the production of Bessemer copper has been 38,000,000 pounds. The mine is developed through three shafts, Czar, Holbrook and Spray, the former of which is little used. The main working shaft at present is Holbrook, about which is blocked out an enormous tonnage of high grade oxide and carbonate ores. The Gardner shaft, now being equipped in a most modern way with steel head frame 100 feet high, &c., will add materially to the output later. These four shafts lie almost in line and quite near together, the distance being but 3500 feet from the Czar, most northerly, to the Gardner, most southerly. About 2000 feet east from the Gardner the company are now sinking the Sacramento shaft, from which large tonnages will be taken later. This will not be in commission for some time, however. Two thousand feet further south, and along the general strike of the formation, is a sixth shaft, the Lowell, which is now down 1350 feet, and is evidently destined in time to become the company's main producer. Their ore reserves, shown in the brief period that has elapsed since this company secured the property, are almost marvelous, and seem to indicate a strength that promises great wealth in this part of Copper Queen ground. The Lowell shaft seems to be pretty close to the center of the valuable ground of the Bisbee

ore bearing formation. More than a mile southwest from the Lowell is the Whitetail Deer, in which work done on the surface by lessors has shown some copper.

The Copper Queen mine has about 125 miles of underground workings in a perfect maze of horizontal openings. It is quite evident that for years the older workings were not carried forward with that regard for the details of engineering that is now considered good practice among most miners. The mine is worked on the square set system, with the waste rock gobbed back. In mining rough selection is made underground, and cull rock is trammed to worked out stopes, filling them solidly. From 1300 to 1400 tons of ore are hoisted daily. About 15,000,000 feet of timber are used annually for all purposes, and most of this is Washington fir, 10 x 10 and 12 x 12 inches. Timbering is a serious cost, about 30 feet being used for each ton of ore mined. But there is no skimping, and every precaution is taken to hold up the roofs, which become quite heavy, as the ore is frequently soft and very loose. Sometimes openings seem to be unnecessarily large.

It is estimated that the mine has ore blocked out for the continuance of its present rate of production for from 15 to 20 years. This ore is nearly all above the 500-foot level, and tributary to the three northerly shafts. It is well known that sulphides run much deeper, while the southerly shafts have not yet been extensively developed. The ore bodies are of large size and irregular in form, and are frequently connected by seams and stringers. It has been by following these stringers that ore has often been found. The management has followed the practice of reporting no assays better than 15 per cent. copper, and the frequency with which "15 per cent. plus" is seen in reports indicates the richness of the ores. Near the surface these are largely oxides and carbonates, running into sulphides at depth. The latter are leaner than the upper ores, but still very rich and profitable. The tonnage now mined is slightly more oxides than sulphides.

### The Smelting Plant.

For a number of years the mine ran upon its oxides, and made black copper in the furnaces, but ten years ago converters were added, and the smelting and Bessemerizing of mixed charges began. The character of the ores is such that practically no barren flux is required, and the proportion of coke to ore is about 12 to 88 per cent. This smelting has been done at a five-furnace plant located close to the mines and in the side of the Bisbee gulch, a cramped and confined spot which has made work difficult and rather expensive. The smelting plant consists of five 42 x 120 inch water jacketed furnaces, of daily capacity for 200 tons each, and barrel converters of the Bisbee type, 5.5 x 8 feet. The matte is about 45 per cent. copper, and the product of the converters is blister copper 99 per cent. fine.

This smelting plant is now being wrecked, and in its place the company have completed and are starting up a magnificent \$2,500,000 plant at Douglas, 25 miles away. This was selected as the site on account of abundance of water and room. The new plant has five 42 x 204 inch furnaces, barrel converters, 9 x 10 feet, and will smelt from 1700 to 1900 tons of ore daily. All refinements of the most modern metallurgical practice have been introduced in this plant, which has been two years under construction. Ores are assembled at great sunken mixing beds, a plan that, if I mistake not, has been adopted at no other copper smelter. These beds carry ore enough to supply the smelter for about 30 days. Each one holds 40 tons to the lineal foot. Electric trains of charging buggies are loaded by steam shovel at these beds and run to the charging floor, where they are mechanically discharged into the furnaces. This plant is admirably laid out, and should be able to make a record for the economical production of copper. Its power house is a building 225 x 110 feet, steel frame, brick filled, with concrete protection for metal work and heavy concrete floors throughout. The machinery layout is beautifully arranged. It consists of five 18 x 30 x 42 inch cross compound Corliss engines, each one running a 400-kw. electric generator; five cross compound blowing engines, air cylinders 36 x 36 x 42 inches, steam 15 x 30 x 42 inches, running normally at 60 revolutions; five 11 x 22 x 36 inch tandem



compound engines running at 100 revolutions and attached to 200-foot smelter blowers of the Connersville type. The pumping capacity is all electric driven, and consists of Gould triplex and De Laval steam turbine pumps.

In addition to their daily production of ores the Copper Queen Company have more than 1,000,000 tons of slag at the old Bisbee smelter that is to be shipped to Douglas and remelted. Hundreds of assays of this dump have shown no values of less than 2 per cent. copper, while many taken from those parts of the dumps where secondary enrichment was possible during the life of this dump are much higher. It is probably safe to assert that better than 50,000,000 pounds of copper are in this dump, which is largely the product of the time when the company were smelting rich oxides direct in the furnaces, and when their ores averaged about 23 per cent. of copper. This dump, also, will be a valuable assistance in the smelting process.

#### Other Property.

Profits from the Copper Queen Company have built the El Paso & Southwestern Railway, whose main line runs from El Paso to Benson, a distance of about 300 miles. The road has a branch into Bisbee, one north to Deming, where connection is made with the Southern Pacific, and another north to Lordsburg, where it connects with the Arizona & New Mexico. At the northerly end of this latter road Phelps, Dodge & Co. have a 17-mile road between Guthrie and Morenci, connecting with their Detroit Copper Company. From Douglas they have a road running south 50 miles to their Moctezuma mines at Nacozari, Sonora. At Benson they connect with the Southern Pacific, and will soon have a connection with the Phoenix & Eastern, a branch of the Santa Fé, which is now being built from Phoenix to Benson and will open a large mining territory. There is also a short branch to Tombstone to reach mines there. At El Paso their lines connect with transcontinental roads and with the Mexican Central. It is said that the part of the El Paso & Southwestern from Bisbee to Benson earned its cost from Copper Queen freights in its first year of business, and that all the remaining lines of this system have been built from surplus, or without outside bond issues.

At Bisbee the Copper Queen Company built a fine hotel, and the Detroit Copper Company have another at Morenci, while it is understood that a still finer one is to be erected at Nacozari. They have six large stores in the region, at Bisbee, Douglas, Morenci, Nacozari, Naco and Cananea. One of these stores does a business of about \$10,000 per day, and all carry large stocks of high grade merchandise, which are sold at reasonable profits and do much to make life comfortable in that distant region. About 1250 men are employed by the company at their Bisbee mines, and for their comfort, as well as that of any other inhabitants of the vicinity, the company have erected a large and handsome gymnasium and clubhouse, and a library and reading room. Their hospital is the finest in the Southwest. Their men are well paid and well used, and are contented. The Butte scale of wages and hours prevails, but there are no unions at Bisbee.

The Lowell property formerly belonged to the Lowell & Arizona Mining Company, and its history is an evidence of how easy it is to miss the biggest things. Its shaft was sunk 970 feet in barren hard lime by a Lowell, Mass., syndicate. At that depth their money and nerve gave out, and a bond was given to W. A. Clark of Butte. He sank 30 feet further and came upon a heavy flow of water. Water at depth in the Bisbee camp has always been an indication of values below. But Senator Clark thought the cost of pumping would be too great and abandoned the exploration. The property was then sold for \$500,000 cash, as it stood, to the Copper Queen, and within 5 feet, or at about 1005 feet below surface, they found the rich sulphides in which they have continued since then. The daily shipments of Lowell ore to smelter are averaging better than 15 per cent. copper.

#### The Mines of the Detroit Copper Company

are at Morenci, near Clifton, Ariz., and are reached by the Arizona & New Mexico Railway. The ores are chiefly sulphide and highly siliceous, and with a gangue carrying

up to 40 per cent. alumina, requiring the most careful treatment. These ores average from 3 to 4 per cent. copper. About 75 per cent. of the product of the mine is subjected to concentration. The concentrator now has a daily capacity for 650 tons of ore, but is to be increased to 1000 tons shortly. Water is not abundant; pumps raise about 125 gallons a minute from the San Francisco River, a height of 1500 feet, to the mine, and this is supplemented by a system of settling tanks and clarifiers so that most of what is pumped is used over and over again. The smelting plant has one furnace 44 x 144 inches and one 42 x 264 inches, a record breaker for size. The converters are of the well-known Bisbee type, and matte is tapped directly to them from the furnace forehearth. Here, as well as at the mines of the Moctezuma Copper Company, at Nacozari, Sonora, which are owned by the same people, extensive use is made of gaseous fuel. Generators to supply up to 1000 horse-power from soft New Mexico anthracite coal have been introduced and are in successful operation. These gas engines are of high efficiency, producing power at 1.3 pounds of coal per horse-power hour. The company have built an 18-mile narrow gauge road connecting with the Arizona & New Mexico at Guthrie, and this road is an excellent example of high-class mountain railroading, rivaling that of the Mountain Copper Company in Northern California. Its average grade for its entire length is 3.5 per cent., and near the upper terminal there are no less than four complete loops within an air line distance of 1½ miles. There are workings down to 400 feet below ground, reached by three tunnels and the same number of shafts.

The entire Clifton district is turning out about 60,000,000 pounds of copper yearly. The ores are, generally speaking, replacements in porphyry and mineralized by secondary enrichment. Milling is an essential feature of the metallurgical treatment at all mines of the district, and at the mine of the Arizona Copper Company they concentrate carbonates, carried in a quartzose gangue.

#### In the Globe District

the Copper Queen interests now possess both the Old Dominion and United Globe mines, through their Old Dominion Company. The ores occur in the hills just north of Globe. Up to 1901 little but oxidized ores were shipped, but sulphides have been more and more used since then. The main workings of the Old Dominion are clustered about a four-compartment shaft and several tunnels, and consist of a block of ground about 1000 feet deep and 3600 feet long. Their ores are highly siliceous, but show immense tonnages averaging from 5 to 10 per cent. copper. Ores from this mine are carried down an aerial tramway 1200 feet long to the company's smelter. This contains four stacks, not all of which are maintained in operation, and a new converter plant. Up to a month ago the smelter was making about 15 tons of copper daily, but under its new management it has greatly increased, and should produce this year double that amount. Both smelter and concentrator are now being enlarged. By the combination effected between this mine and the United Globe a great saving in costs can be effected, and it is partly owing to this combination that the output of copper has already been so materially increased. A large amount of barren flux has been required, but by the use of ores from the Globe and other mines of Phelps, Dodge & Co. this can be done away with, while ores from these mines can be used in the smelter at Douglas. Sulphides from Bisbee are now used to assist in fluxing, but the Old Dominion Company hope soon to develop their own ores.

From Douglas south to Nacozari, Sonora, one travels on a railroad built by Phelps, Dodge & Co., and which is just now reaching the mine of the Moctezuma Copper Company, though it has been three years under construction. The distance is 90 miles. This mine is producing at the rate of 10,000,000 pounds of copper yearly, and has the unenviable distinction of mining the leanest copper produced in the Southwest. The average tenor of its raw ores is about 2.5 per cent. copper. This ore occurs in a broad friction zone of fine grained siliceous rhyolite as auriferous chalcopryrite and bornite. The ore body is exceedingly large, and some stopes are of great size, while mining is largely by tunnel. One tunnel that is now driv-

ing toward ore will reach the zone at the depth of  $\frac{1}{2}$  mile. The daily production is nearly 700 tons, all of which passes through a large and modern concentrator, of which Dr. L. D. Rickerts is consulting engineer. This concentrator is of simple design, and presents no unusual features. It is run by 500 electrical horse-power. It saves 90 per cent. of the ore values. At the smelter, which is several miles distant, there are two 44 x 130 inch water jacket furnaces, elliptical in shape. About 40 per cent. of the concentrates go to smelter direct, the rest being briquetted. Matte is very low grade, but the converter product is 99 per cent. blister copper, carrying a considerable percentage of precious metals, as the lining of the converters is extra heavy and comes from gold and silver quartz mined on the company's lands. At the smelter about 600 horse-power is produced from gas made in Loomis-Pettibone gas machines. The power house contains eight single cylinder Crossley gas engines 18.5 inch diameter and 24-inch stroke, running at 200 revolutions. Each is coupled direct to a 65-kw. direct current gen-

## A Furnace Charging and Distributing Apparatus.

BY FRANK C. ROBERTS, PHILADELPHIA, PA.

The very general adoption of mechanical filling for blast furnaces has resulted in the development of several designs of charging and distributing apparatus, while as a rule the means of conveying materials to the furnace top have been confined to adaptations of the incline plane equipped with a skip car.

In designing the various forms of charging and distributing apparatus it would appear that the principal object borne in mind has been to secure a uniform distribution of the volume of stock in the lower hopper, a condition which satisfies the requirements in some instances. It is well known, however, that the dumping of a skip car leads to the separation of the coarser from the finer materials, and in cases where the furnace mixture is made up of coarse and fine stock it becomes

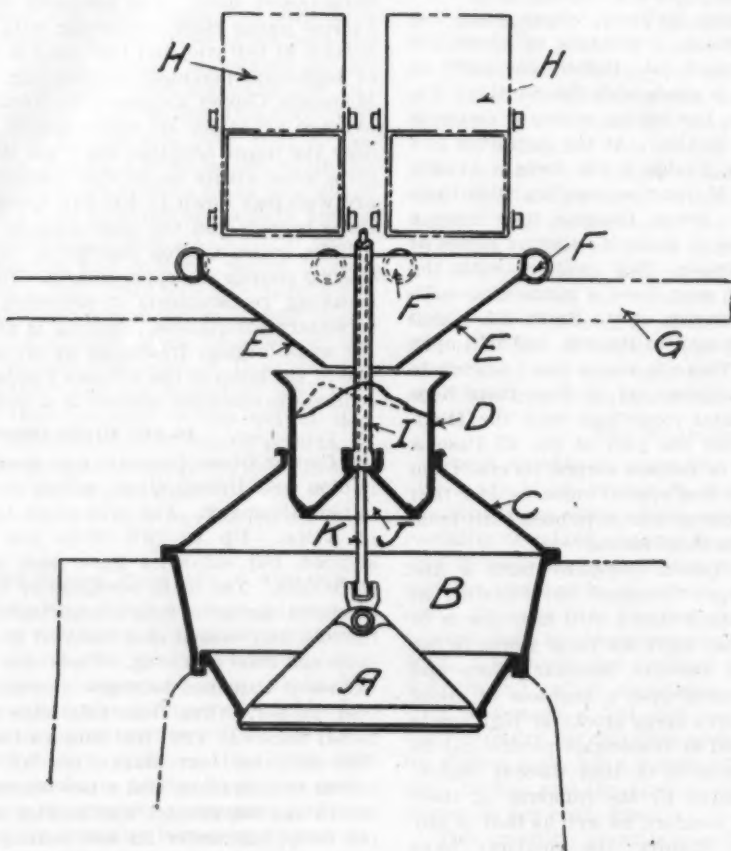


Fig. 1.

erator. These deliver to the main switchboard in the power house, from which the current is distributed at 250 volts to some 40 motors ranging in size from 5 to 175 horse-power. This gas plant has been operated with both wood and coal, or either. The use of producer gas made from wood alone is unusual, but it has here been found possible and economical.

In addition to these various mines the firm of Phelps, Dodge & Co. have spent a large amount of money in exploring the Sierra de Cobra property lying between various mines of the Cananea Consolidated in Sonora. But no mining has been undertaken there, nor is it probable that any will be.

The fourth annual convention and reunion of the Wisconsin auxiliary of the National Association of Stationary Engineers were held in Milwaukee on June 18 and 19. The association is organized primarily to accomplish better education of stationary engineers and the art and science of steam engineering. One of the cardinal principles, as stated in the articles of organization, is "discountenancing strikes *in toto*."

necessary to provide some means to remix the materials, so that upon their descent into the furnace the distribution of coarse and fine throughout the mass will be fairly uniform.

Again, it will be readily conceded that a distributor which may work very well in connection with a certain class of materials may not be adapted to materials of different physical characteristics, and it is, therefore, desirable that a distributing apparatus should be capable of adjustment in order to meet the varying conditions. Manifestly it is impracticable to design automatic adjustments or to provide for the variations in the physical characteristics of stock which may occur between consecutive charges. Certain furnaces use fine materials, others coarse materials, and still others a combination of both; consequently a distributing apparatus should be capable of adjustment to meet at least the average conditions prevailing at any furnace.

The above considerations led the writer some years ago to design the herein described apparatus, the objects of the design being:

a. To secure a uniform distribution in the lower hopper of the volume of the materials charged and to



provide an adjustment which would secure this end with materials of varying physical characteristics.

b. To provide adjustments by means of which the distribution of coarse and fine materials may be controlled.

In the accompanying illustrations Fig. 1 is a general sectional elevation of the charging and distributing apparatus, Fig. 2, a plan showing the distributing chutes in line with each other, and Fig. 3 a plan the same as Fig. 2, except that the chutes are twisted. The different parts of the apparatus are noted in the key at the side

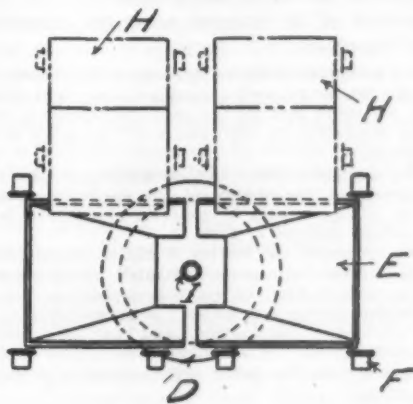


Fig. 2.

of the illustrations. In operation the skip cars H discharge into the chutes E, the materials thence descending into the supplementary hopper D. Upon lowering the bell J the contents of D pass into the furnace hopper B, whence, by lowering the bell A, they are discharged into the furnace.

The objects of the design heretofore stated are secured in the following manner:

a. *Uniform Distribution of Volume.*—It will be admitted that, if a fairly uniform volume distribution of materials is secured in the supplementary hopper D, the volume distribution in the furnace hopper B should be satisfactory. It will be noticed that the chutes E are

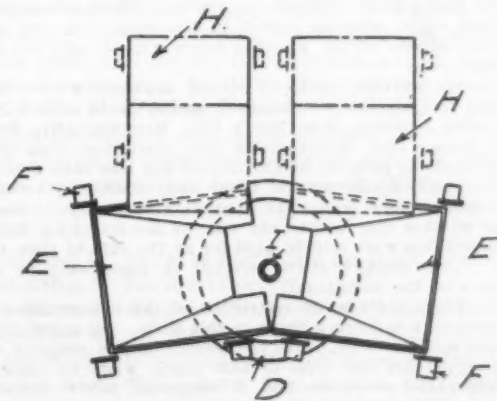


Fig. 3.

carried by wheels F, resting on girders G, a condition which permits the ready movement of the chutes backward and forward. Should it develop upon filling the supplementary hopper D that the peak of the contents is not central, as indicated by the dotted lines, Fig. 1, the chute should be moved toward the bell rod until, for average conditions, the peak of the contents of the hopper D is approximately on the center line, as indicated by the full line in Fig. 1. Having made this adjustment, the bell J is lowered and the materials discharged into the furnace hopper B, the passage of the materials over the bell J further assisting the distribution of volume, with the final result that the volume distribution in B is as nearly uniform as can be expected.

b. *Control of the Mixture of Coarse and Fine Materials.*—Upon the discharge of the contents of the skip car H into the chute E there exists, as before stated, a tendency

for the coarse and fine materials to become separated. The relative arrangement of the skip car H, the chute E and the supplementary hopper D is such that the materials after being discharged from the skip car must turn at right angles in order to enter the hopper D; this change of direction in combination with the rebounding action of the materials against the chute and the interference of the bell rod I to the flow of the materials is found by experience to be of great importance in that it mixes together the coarse and the fine materials. Again, it is to be noted that any fine materials which may leave the chute E slowly are delivered well toward the center of the hopper D and on top of the coarser materials previously delivered into the hopper; these fine materials upon lowering the bell J naturally become distributed throughout the volume.

Should it develop that the physical characteristics of the materials are such that the distribution of coarse and fine is not satisfactory when the chutes are located in line with each other, as in Fig. 2, a further adjustment is provided, as illustrated in Fig. 3. Fig. 2 shows the chutes located longitudinally in line with one another and central with reference to the bell rod, while Fig. 3 shows the chutes twisted so that the inner ends of the chutes are nearer the incline plane than in Fig. 2. This adjustment of the chutes is possible because the wheels F are furnished with very wide threads so as to permit the chutes to be twisted and yet be supported by the threads of the wheels resting on the girders G. The object of this adjustment is to vary the opening between either side of the chutes in Fig. 2 permits too much coarse materials to pass into the far side (from the skip cars) of the hopper D, the chutes should be twisted as indicated in Fig. 3, whereby the openings between the bell rod I and the far sides of the chutes are decreased, thus restricting the flow of coarse materials to the far side of the hopper D and facilitating their passage into the near side of the hopper D. Of course, the reverse of the foregoing conditions might prevail, in which case the chutes would be twisted in the opposite direction. It is evident that the necessary amount and direction of the twist given to the chutes depend upon the average physical conditions of the materials to be charged and will vary with almost every furnace.

It will thus be readily understood that the prime factor in the design is to secure a fair average volume and coarse and fine distribution of the materials in the supplementary hopper D, and that once this is attained the flow of the materials over the bells J and A will increase the uniformity, so that the distribution in the furnace will be as nearly perfect as the natural limits of the problem allow. It must be borne in mind, however, that while the distribution of volume and of coarse and fine may be satisfactory, yet the proper working of the furnace depends not only upon the distribution secured by the charging apparatus, but also upon the relative proportions of the bell A, the stock line and other dimensions of the furnace itself, features with which the distributing apparatus is not concerned. It is also evident that when the chutes are once adjusted it is necessary that they be maintained in the desired position; clamps are provided for this purpose.

The writer is aware, of course, that there is such a vast difference between the physical characteristics of the coke, ore and limestone that it is impossible to adjust the chutes so that the best location can be fixed upon for all three materials. Experience has shown, however, that if the chutes are adjusted for the ore and stone charge no difficulty results in connection with the coke. This is due to the fact that the volume of the coke charge is much greater than that of the ore charge. Any lack of uniform distribution of coke in the hopper D is relatively a very small percentage of the total volume, whereas the same variation in the case of the ore charge is a much greater percentage of the total.

Experience has shown that the distribution with this apparatus is under such control that, if a furnace is working low on one side, the chutes can be adjusted so as to transfer the low point to the opposite side of the furnace;

consequently there is some intermediate location for the chutes which should give a satisfactory distribution.

It may be well, also, to call attention to the fact that this apparatus has been applied with success to single as well as double skip furnaces. In the former but one chute is employed, the single skip discharging into it, as shown in the illustrations.

The advantages of the design may be summarized as follows:

1. That the apparatus may be adjusted to meet the conditions at any furnace, both for the usual requirements and for any variation which may be made in the physical character of the materials charged.

2. That should it develop, upon sounding a furnace, that one side is working more rapidly than another, adjustments may be made which will correct the irregular working.

### The Chicago Machinists' Strike.

Paul Blatchford, secretary of the Metal Trades Association at Chicago, who has the management of the employers' end of the machinists' strike, which is now in force, states:

"We have the machinists beaten already, and it is only a question of a few days or weeks at the most before their organization will be completely routed. Already former members of the union are coming to our members and asking to be re-employed on the individual contract basis, and the more the individual workman becomes familiar with the contract which our members are making, the more he realizes that it gives equal protection to employer and employee against the domination of irresponsible trouble makers. Thirty-five shops were affected, and of these all but two are now working, these two being in a position where they do not care to open at present for business reasons. New men are coming in from other cities, and large numbers are being recruited from the ranks in Chicago. Of course, there are a good many of these new men who are not expert at the work at which they are being placed, but it will not be long before the shops are being run with a full complement of skilled men. Men who are returning to work do so on the basis of the 54-hour week, which includes a half holiday on Saturday. Every show of violence is being immediately followed up, and the disturbers are arrested and sent to jail. We are receiving excellent co-operation on the part of the police force, which is augmented by special policemen employed by this association."

At the entrance to shops affected and on dead walls in the neighborhood posters have been affixed bearing the following offer of reward:

"Reward.—The Metal Trades Associations offer a reward of \$50 for information that will lead to the arrest and conviction of any person who has assaulted and injured any of the employees of their members. Chicago Metal Trades Association, National Metal Trades Association; offices, 1610 Ashland Block."

The body of the individual contract which is being entered into between the employers and the individual workmen is as follows:

Whereas, The parties hereto are desirous of securing stability in their relations as employer and employee and equal protection of their respective rights, and whereas both parties accept the principles set forth on the back hereof and consider same a part of this agreement, therefore they hereby agree to and with each other as follows:

ARTICLE I. That for the period of.....from the above date, the employee agrees with the employer to perform in a loyal, faithful and workmanlike manner the services required of him by the employer in the capacity of.....; and the employer agrees with the employee, in consideration of such service, to pay the employee as follows: When working by the.....for such period, payable weekly.

ARTICLE II. It is understood and agreed that the employee reserves the right to withdraw from this contract and quit the service herein agreed upon if sick, incapacitated or if the employer violates this contract, but shall not so quit this employment during the life of this agreement on account of the grievance of some other person or persons, or in furtherance of any strike or demand on the part of any other persons.

ARTICLE III. It is hereby understood that the employer reserves the right to suspend or terminate this contract if at any time work may cease or slacken, or the services of said employee be found unsatisfactory. The services of the employee shall not be deemed unsatisfactory within the meaning and spirit of

this contract, nor shall he be discharged or suspended, merely because of the demand or request of any person or association. And in case the employer suspends the employee during the period of this contract, the employer agrees, when putting men on, to give preference to said employee over men not having such contracts, and as between men having such contracts to give preference to those who have worked the longest time under such contracts.

ARTICLE IV. It is further agreed that if either party violates this contract he shall forthwith pay to the other as liquidated damages the sum of \$15, which may be deducted from any money owing him by the other party.

ARTICLE V. It is mutually agreed between parties hereto that this written agreement constitute the entire agreement and understanding between the said parties.

The back of the contract bears the following Declaration of Principles:

1. We recognize that the interests of both employer and employee should be properly protected, and that these interests must at all times rest on the fact that employer and employee are both interested in the results of the work in which they are engaged.

2. We recognize that any restriction of the enterprise of the employer or the energy of the employee, resulting in depreciation of the quality or quantity of product, is detrimental to the mutual interest of both.

3. We recognize the justice of the recommendation made by the Coal Strike Commission appointed by President Roosevelt, "That no person shall be refused employment, or in any way discriminated against, on account of membership or nonmembership in any labor organization; and that there shall be no discrimination against, or interference with, any employee who is not a member of any labor organization by members of such organization."

4. We recognize that there should be no restriction to the opportunities that may be offered to deserving boys to acquire a trade, and that employers and employees should join in their efforts to instruct such apprentices, provided they be employed under written contracts for a specific time of service.

5. We recognize that sympathetic strikes, lockouts and boycotts are relics of barbarism, because they result in no permanent benefit to either side of a contest, and inflict unjust and unfair injury on the public, who depend on our joint efforts for their comfort and welfare.

6. We recognize that as the realization of mutual benefits represented in profits and earnings from our joint labors depends largely on the employer finding a suitable market for the product, he can best determine the methods of work, the selection of employees, and the character of work to be performed by each.

Inside the shops the following notice has been posted:

1. Until further notice this machine shop will run on the basis of 54 hours per week, with a half holiday Saturday.

The working hours will be from .... a.m. to 12 noon, .... p.m. to .... p.m. Saturdays from .... a.m. to .... Night gangs shall work not to exceed 54 hours per week on the regular night schedule posted in the shop, and any overtime worked outside of the schedule hours will be paid for as overtime.

2. All overtime up to 12 o'clock midnight will be paid for at the rate of time and one-half, and after 12 o'clock, and the following holidays, New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day, and Sundays, shall be paid for at the rate of not less than double time.

In cases of emergencies, where shop machinery breaks down or needs repairs, and it is absolutely necessary to repair the same so that the factory can run on the following day, or on Monday, this work will be paid for at the rate of time and one-half. (The repairs above referred to apply only to the machinery of the company.)

3. There shall be no restriction of the opportunities for deserving boys to learn a trade in this shop. No apprentice shall, except for just cause, leave the service of this company until he has served his full term of four years, when he shall receive an apprentice certificate, and, if competent, receive journeyman's wages. This shall not effect existing contracts with apprentices.

4. There shall be no arbitrary limitation of the amount of work a workman or machine may turn out in a day. We will not countenance any conditions which are not fair and which do not insure a good wage to a good workman.

5. This company being responsible for the work turned out by their workmen shall, therefore, have full discretion to designate the men they consider competent to perform the work, and to determine the conditions under which it shall be prosecuted. Where the nature of the work permits, two or more machines will be operated by one person. While disclaiming any intent to reduce the wages of our competent machinists, roughing and duplicate work will be done by handy men, or other employees, at the discretion of the company.

6. No reduction will be made in the wages paid any individual workman at the present time without due notice to such workman.

7. Foremen shall be the agents for the company and not members of any labor organization.

To facilitate correspondence, the American Foundrymen's Association has changed its address from P. O. Box 432, New York City, to the residence of the secretary, Dr. Richard Moldenke, Watchung, N. J.



# The American Society for Testing Materials.

SEVENTH ANNUAL MEETING, ATLANTIC CITY, N. J., JUNE 16 TO 18, 1904.

Evidences of a year's progress in America's iron and steel industry were again recorded and plans for another year's advancement were laid at the seventh annual meeting of the American Society for Testing Materials, held at Atlantic City, N. J., June 16 to 18, inclusive. It was a most successful meeting in every respect, and it is safe to assert that the very maximum amount of work of a most strenuous nature was accomplished within the minimum space of time. The most perplexing questions of the day within the scope of the society were discussed with a zeal and earnestness which bespoke a high degree of interest in the workings of the organization. The attendance was greater by 50 per cent. than that of last year's meeting, as there were more than 150 members and guests present. The reports of the several standing committees indicated most careful and painstaking work. The papers were of an excellent character, and the admirable manner in which Dr. C. B. Dudley of Altoona held matters in control as presiding officer maintained an interest which never lagged, and which resulted in a freedom of discussion incalculably valuable. His versatility of knowledge and breadth of experience constantly became more apparent as the meeting progressed. The wonderful growth of the society and much of its success are to be attributed to the untiring efforts of its secretary-treasurer, Prof. Edgar Marburg of the University of Pennsylvania, to whose efficient work several members found occasion to refer during the meeting.

## THURSDAY AFTERNOON SESSION.

The opening session on Thursday afternoon began with the prompt dispatch of routine business. The annual report of the Executive Committee showed that during the year the membership has grown from 349 to 485. Professor Marburg supplemented this statement by saying that since the report was printed the membership had been increased to just 500. During the Atlantic City meeting this number was further augmented.

The report of the treasurer, covering the period from June 30, 1903, to June 10, 1904, showed a cash balance of \$496.68. On June 30, 1903, the cash balance was \$263.27. The total receipts for the year were \$5215.68, and the disbursements aggregated \$5009.27.

The Executive Committee reported that the list of technical committees has been increased, partly in pursuance of action at the annual meeting of 1903, as follows:

- Committee H. On Standard Tests for Road Materials.
- Committee I. On Steel-Concrete.
- Committee J. On Corrosion of Metals.
- Committee K. On Standard Tests for Boilers.

At the request of the Committee on Bitumen that committee has been discharged. The number of technical committees is now 11.

In order that the society may become self sustaining as soon as possible, the Executive Committee proposed an amendment to the by-laws, designed to increase the annual membership dues from \$3 to \$5. Concerning the relations of the society with the International Association for Testing Materials, the committee reported that during the past year they have been limited practically to routine correspondence. The last congress was held in Budapest, September, 9-14, 1901. The next congress which was originally to be held at St. Petersburg in 1903, has been twice postponed, first till 1904, then till 1905. The second postponement was occasioned by the war between Russia and Japan. During the past four years the society has remitted the sum of \$1916.50 to the International Association, for which practically no returns have been received. The American membership is now far ahead of the membership in any other country, and our remittances to the International Association are now at the rate of \$700 per annum.

The International Association having finally abandoned the plan of establishing an international sidero-chemical laboratory, the American subscribers to the funds raised some years ago for the above purpose, viz.—the Pennsylvania Steel Company and Dr. Richard Moldenke—very generously agreed to donate these subscriptions, with accumulated interest, to the treasury of the society.

The matter of publications on the part of the International Association, concerning which so much dissatisfaction has been felt in this country, the plan announced for the St. Petersburg congress was as follows:

The reports of committees and referees on technical subjects are to be translated in three languages—English, German and French—and sent to every member of the association, free of charge, in whatever language he prefers. Scientific papers of a nonofficial character are to be printed in their original language, followed by abridged summaries in three languages. Such papers are to be supplied free of charge to members in attendance at the congress, and sold at the rate of \$2.50 for the set to members in general.

The report was approved and by motion it was decided to refer the suggestion of increasing the annual dues from \$3 to \$5 to the membership for decision by letter ballot.

The election of officers and one member of the Executive Committee for a term of two years was by letter ballot. The result was a unanimous selection as follows: President, Charles B. Dudley; vice-president, R. W. Lesley; secretary-treasurer, Edgar Marburg; member of Executive Committee, James Christie.

The balance of the session was devoted to the topic of

## Preservative Coatings.

In introducing this subject Dr. Dudley called attention to its importance, stating that during the last few years the Pennsylvania Railroad has spent \$35,000,000 for steel cars, which are being slowly eaten up by rust, and that at present there is no adequate means of preventing this.

S. S. Voorhees, chairman of the Committee on Preservative Coatings for Iron and Steel, reported that in view of the wide difference of conditions and requirements demanded of preservative coatings, it was decided to publish in pamphlet form the individual opinions of the members of the committee. Summarizing these opinions, Mr. Voorhees said:

It is felt that no one set of standard requirements can be imposed on preservative coatings used to protect steel cars, bridge members, structural steel hidden between plaster and expanded metal on one side and brick or stone curtains on the other, and so on through the widely different conditions and requirements demanded in each special case. In general, however, the paint film which remains most impervious to water and is satisfactory in other respects will probably afford the best protection.

The protection afforded by cement coatings, though of recent introduction and limited application, seems worthy of further investigation. At present this coating requires a moist atmosphere while setting, a condition hard to meet in practice. Its action apparently depends not so much on impenetrability to moisture as on the neutralization of carbon dioxide and acid gases, &c. This action is so different from oil paint films that a comparison of these two types of coatings will be difficult.

W. A. Aiken, after stating that service tests should be very markedly distinguished from laboratory tests, suggested that some arrangement should be made, if possible, to divide preservative coatings into groups for specific purposes, rather than to examine every kind with the idea of realizing a panacea. He recommended a series of field service tests, conducted perhaps through the co-operation of the railroads and the manufacturers of the well-known coatings, to include structures and cars of various types, applying the various coatings, such as lead, carbon, graphite, &c., side by side. The laboratory service tests, he suggested, should be carried out on two metal plates and one glass plate, and should be so elaborated as to disclose the effects of alternate exposure to moist and

dry air, acid and alkali fumes, the sand blast, &c. Chemical determinations, he said, should take into consideration the quality and percentage of vehicle and pigment in each coating as a guide for ascertaining the proper proportions from the results of the field and laboratory tests.

Dr. Dudley called attention to the disadvantage of both the field and laboratory tests, telling of the difficulty of keeping track of cars in service, for instance, and also to the fact that in the case of laboratory tests the samples do not get the same treatment as is given in actual practice. He then related his experiences in connection with a series of incomplete tests made with a view of finding a coating which would exclude moisture from the surface coated, going on the theory that if a protective coating keeps out water in every form there will be no corrosion. He described in detail the method of employing the dextrine test, and concluded by saying that if these experiments are to be trusted the protective coatings at present available are not as valuable as has been hoped for.

A. H. Sabin maintained that comparative tests for protective coatings for structural steel must be time tests under such conditions as are to be met in actual practice, asserting that any so-called accelerated tests which have yet been proposed are not of any value, but on the contrary are misleading. He advocated the use of steel plates thoroughly cleaned, either by means of sand blast or pickling, and then hung for exposure in places of actual practice. He said that he would never take any interest or attach the slightest importance to paint tests made on rusty surfaces.

G. W. Thompson stated that protective coatings should be selected or designed by the architect or engineer according to the conditions to which they are to be subjected. He summarized his findings under a number of heads.

In the further discussion of this topic, Dr. Sabin said that he believed varnishes to be less porous than the oil coatings. He recommended a coating containing asphaltum, and referred to the attempts now being made to make coatings by applying a Portland cement mixture. The latter had many difficulties, however, and was still in a comparatively early state of development. Successful results have scarcely been reached, although the experiments look very hopeful. He emphasized the importance of cleaning properly the surface to be coated, and suggested investigation of the relative value of spraying the paint instead of applying it by means of a brush. He said that a slow dryer, taking at least 12 hours, should be used, and that the successive coats should not be applied within a week of one another. He called attention to the thinness of the paint film and to the liability of its being scratched and marred, stating also that there are places, such as low viaduct bridges with trains running underneath them, where paint cannot be expected to stand.

Dr. Dudley said that while he appreciated the necessity of thoroughly cleaning the surfaces, he could not agree that it is desirable or possible to allow as great a length of time for drying as Dr. Sabin named. He spoke of the earning capacity of a steel car as an instance, remarking that it would be cheaper to paint oftener. He said that steel cars were produced at the rate of 100 per day, and that it was impossible to keep 1200 cars on the tracks during the process of painting. Good painting, he thought, could be obtained with rapid drying. The cleaning, he said, should simply detach anything that will peel off. He recited the experiences with rust at the Jersey City train sheds of the Pennsylvania Railroad, stating that the difficulty was being largely overcome by applying paraffine paper on top of the first coating before the paint is dry and then applying a finishing coat on top of the paper. This protection, he said, seemed to prevent corrosion.

Robert Job read an interesting paper on "Results of an Investigation Concerning Causes of Durability of Paints for Structural Work," which embodied the findings of the tests outlined in his paper before the Franklin Institute, printed in the *Institute Journal* for February, 1904. It showed that the fineness of the particles of pigment increased the protection.

## THURSDAY EVENING SESSION.

The second session was opened Thursday evening by the annual address of the president, on "The Influence of Specifications on Commercial Products." Dr. Dudley brought out many interesting points, which obtained the hearty indorsement and favorable comments of many of his hearers.

A paper on "Alloy Steels: Self Hardening and High Speed," which we print in another column, was presented by William Metcalf. This important contribution was listened to with the greatest interest. In the discussion Dr. Dudley mentioned the mending of a fracture in a locomotive frame by means of the Goldschmidt aluminothermit process, the alloy at the weld showing a tensile strength of 91,600 pounds, elongation in 8 inches 21.5 per cent. and an analysis as follows: Carbon, 0.102; phosphorus, 0.07; sulphur, 0.03; manganese, 2.32; silicon, 1.23. In answer to several questions in the discussion which followed the reading of Mr. Metcalf's paper, the author stated that the new high speed steels were not air hardening, inasmuch as they would not harden if simply left in the air to cool after heating.

"Some Statistics of the Cement Industry in America" was the title of a paper read by R. W. Lesley. This showed a phenomenal growth within a very short time. Considerable interest was taken in a statistical table showing the imports and domestic production of Portland cement from 1882 to 1902. During that period the imports decreased steadily, and the domestic production increased from 85,000 barrels in 1882 to 17,230,644 barrels in 1902. Mr. Lesley estimated that the production figures for 1903 would foot up to 19,000,000 barrels.

## FRIDAY MORNING SESSION.

On Friday morning separate meetings were held simultaneously by the sections on cast iron and on cement.

The section dealing with the subject of cast iron opened with the presentation of the report of the Committee on

### Standard Specifications for Cast Iron and Finished Castings.

by Walter Wood, chairman. In treating the subject in general the report said, in part:

The drafting of standard specifications naturally brings into harmony various thoughts and suggestions, all of which are good and lead to practical results, and which probably only need to be reduced to a system for the sake of reaching the desirable end—viz., a uniformity of methods. In addition to this general purpose, the committees have had in mind two most important points:

1. To establish an intelligent standard for the purchase and sale of pig iron, and thus to abandon the old fashioned way of grading the metal from its appearance.

2. To adopt a standard test bar, and to fix the manner in which it shall be made and tested. The committee has furnished a measure to which the test bars now in use throughout the various trades can be referred.

If nothing farther had been accomplished, the work of the committees would have been most useful. They have gone farther, however, and have covered quite thoroughly the whole field of cast iron and finished castings.

#### THE SPECIFICATIONS.

**Analysis.**—It is recommended that all purchases be made by analysis.

**Sampling.**—In contracts where pig iron is sold by chemical analysis, each carload, or its equivalent, shall be considered as a unit. At least one pig shall be selected at random from each 2 tons of every carload, and so as to fairly represent it.

Drillings shall be taken so as to fairly represent the fracture surface of each pig, and the sample analyzed shall consist of an equal quantity of drillings from each pig, well mixed and ground before analysis.

**Allowances and Penalties.**—In all contracts in the absence of a definite understanding to the contrary, a variation of 10 per cent. of silicon, either way, and of 0.01 in sulphur above the standard is allowed. A deficiency of over 10 per cent. in the silicon, up to 20 per cent., and a further increase in sulphur up to 0.01 over the above allowance, subject the shipment to a penalty of 1 per cent. in the price for each element so affected.

**Base Analysis of Grades.**—In the absence of specifications the following numbers, known to the trade, shall represent the appended analyses for standard grades of foundry pig iron, irrespective of the fracture, and subject to allowances and penalties as above:



| Grade.     | Per cent.<br>silicon. | Per cent.<br>sulphur. |
|------------|-----------------------|-----------------------|
| No. 1..... | 2.75                  | 0.035                 |
| No. 2..... | 2.25                  | 0.045                 |
| No. 3..... | 1.75                  | 0.055                 |
| No. 4..... | 1.25                  | 0.065                 |

After the general specifications, the report contained the recommendations of the subcommittees concerning the various headings assigned them. Each of these sections was discussed separately.

Dr. Richard Moldenke opened the discussion on the standard specifications by rehearsing the criticisms of the American Foundrymen's Association and the Mining Engineers at their recent annual meetings. He said that it was believed that the requirement of taking one pig from each 2 tons of every carload is too exacting, and that one pig from every 4 tons would answer the purpose. The penalty of 1 per cent., it was claimed, is entirely too low, and it was suggested that the penalty be increased to 4 per cent., which would be more nearly in line with the difference in value of the grades in question. The clause for allowances and penalties, as amended by the Foundrymen's Association, is as follows:

In all contracts, in the absence of a definite understanding to the contrary, a variation of 10 per cent. of silicon either way, and of 0.01 in sulphur above the standard, is allowed. A deficiency of over 10 per cent. in the silicon, up to 20 per cent., and a further increase in sulphur up to 0.01 over the above allowance, gives the buyer the option of rejecting the shipment or paying for same at a penalty of 4 per cent. in the price for each element so affected.

This, it will be noted, besides increasing the penalty, gives the buyer the option of either rejecting the shipment or accepting it and benefiting by the penalty. There was considerable discussion on this subject, all of which rather confirmed the arguments of Dr. Moldenke. The changes as proposed by the foundrymen, it was held, would make the specifications better fit commercial conditions.

In response to remarks to the effect that the specifications might be deemed rather rigid in reference to the variation allowed in the matter of sulphur, Dr. Dudley stated that it was frequently the case that iron coming from the furnaces showing but 0.03 sulphur would show 0.10 to 0.12 sulphur in the castings, indicating that from 0.07 to 0.09 per cent. had been added in the process of melting in the foundry. This fact, he held, ought to serve as an influence in keeping the sulphur as low as practicable in the specifications.

The specifications were referred to the Executive Committee to be submitted to the membership for action by letter ballot.

#### Cast Iron Pipe Specifications.

The proposed standard specifications for cast iron pipe and special castings were then taken up. The report described the pipes in detail, giving an elaborate system of tables of specified dimensions.

In the discussion which followed the presentation of this paper a few criticisms of a minor nature were made, which were readily combated successfully by Mr. Wood and the specifications were approved and adopted.

The next section of this report pertained to the proposed standard specifications for locomotive cylinders. H. E. Dillon opened the discussion by asserting that he thought the minimum limit of the silicon might be a little lower, and this was concurred in by several of the members who participated in the discussion. It was finally agreed that 1 to 1.75 per cent. would be more equitable limitations.

James Christie said that the deflection of 0.08 inch allowed for the test bar was too small and recommended that it be changed to 0.12 inch. I. A. Kinkad of Schenectady, N. Y., related his experiences in connection with certain tests supporting Mr. Christie's contention, and adding that the specifications could safely require a transverse strength of not less than 3200 pounds and a deflection not less than 0.10 inch. The specifications were referred to the Executive Committee, to be changed along the line suggested if deemed expedient, and their findings are to be submitted to the membership for their approval by letter ballot.

The Committee on Proposed Standard Specifications for Cast Iron Car Wheels submitted their report, which

is available in printed form. Dr. Dudley opened the discussion by stating that the subject of car wheels was one of the most serious questions of the day in railroad work. He said that the weight and capacity of the cars have increased enormously of late without a corresponding increase in the efficiency of the car wheel. The subject, he said, was actually causing considerable anxiety among the railroads. Dr. Dudley said that while the question of whether the limit of the cast iron car wheel has not been reached naturally confronts one, he believed that the cast iron car wheel could be continued successfully even with the 100,000-pound car. He read the paper which he presented at the Atlantic City meeting of the American Institute of Mining Engineers, which dealt principally with the importance of grading by tape sizes. Later in the discussion he explained that the variation in the tape sizes of the wheels is due principally to the annealing, as the wheels grow under this heat treatment. A point developed in the discussion was that the top wheels in the annealing oven invariably failed to stand the drop or thermal tests. This was attributed to the fact that the heat did not reach the wheels directly under the cover of the oven. C. W. Sherman of Pittsburgh stated that a very successful solution of this problem was found in using a cast iron cover on which a thickness of 6 inches of hot sand is placed. It was suggested that the severity of the tests be increased. One of these changes was that the specification in this connection read "the wheels must not break or crack," instead of "without breaking in two or more pieces." Mr. Sherman told of the proposed tests of the M. C. B. Association concerning car wheels and pointed out several advantageous features of these tests. W. R. Webster asked for information regarding the reannealed wheel, and Dr. Dudley answered that while they stand the test, there is a belief that they do not wear well. It was suggested that the number of blows named in the specifications be increased.

It was decided to refer the specifications back to the subcommittee, who are to submit them to the members of the society for their approval by letter ballot through the Executive Committee.

The next section referred to the proposed standard specifications for malleable castings submitted in the past to the American Institute of Mining Engineers and published in *The Iron Age* at the time.

These specifications were referred back to the committee to be sent to the members for their approval or rejection by letter ballot.

It was decided that the specifications for gray iron castings should be reported back to the committee and brought up for further discussion at the next annual meeting.

The report of the Committee on Standard Specifications for Cement, which was submitted by George F. Swain, was supplemented by the following papers:

- "Practical Cement Inspection." Charles F. McKenna.
- "Some Possible By-Products in the Portland Cement Industry." Clifford Richardson.
- "The Boiling Test for Portland Cement." Frederick H. Lewis.
- "Tests of Steel-Concrete." A. N. Talbot, F. E. Turneure, Edgar Marburg.
- "The Mechanical Defects of Sieves Used in Determining the Fineness of Cement." E. W. Lazell.

#### FRIDAY AFTERNOON SESSION.

The fourth session, on Friday afternoon, was opened by William R. Webster's presentation of the report of the Committee on

#### Standard Specifications for Iron and Steel

The chairman had addressed a circular letter to the members of the committee, requesting an expression of individual opinion on the general question of the desirability of considering various modifications in the standard specifications proposed by committees of other societies, and in part adopted by these societies. The replies showed the sentiment of the committee to be greatly divided, and hence the chairman thought it expedient to submit this question to the judgment of the society at this meeting. In that connection he called attention to the movement that has been recently initiated in England on similar lines and under conditions which are, in

part, distinctly more favorable than those under which we are laboring. The British Government is lending its financial support to the work in the form of a grant of £3000, the Indian Government appropriated an additional sum of £1000 and the committee has further the direct financial support of five engineering societies. The scope of the field which this Committee on Engineering Standards proposes to cover may be judged from the fact that committees and subcommittees are appointed to consider in all their phases the following subjects: Bridges and general building construction, railway rolling stock underframes, locomotives, rails, electrical plant, screw threads and limit gauges, pipe flanges, cement.

The reports of the various subcommittees were then presented, as follows:

Report on the Specifications for Iron and Steel Structures, American Railway Engineering and Maintenance of Way Association, as Amended and Adopted in March, 1904. J. P. Snow, chairman.

Comparison of the Specifications for Axles and Forgings, Proposed by the Committees of the American Railway Master Mechanics' Association and the American Society of Mechanical Engineers, with the Standard Specifications Adopted by the American Society for Testing Materials. H. V. Willie.

Report on the Specifications for Steel Rails, American Railway Engineering and Maintenance of Way Association, as Amended and Adopted in March, 1904. William R. Webster, chairman.

After a spirited discussion in which several members spoke favorably of some of the suggestions of the other American engineering societies, and pointed out apparent defects in the specifications in question, it was decided that the report be referred back to the committee with instructions that they bring themselves in harmony, if possible, with the other societies, and submit a complete detailed report, together with a minority report, if necessary, giving the reasons for modifying or affirming the specifications as they now stand, and that this report be printed and sent to the members of the society sufficiently in advance of the next annual meeting to permit a complete discussion prior to the meeting.

Max H. Wickhorst submitted a report embodying specifications for air brake hose, which was adopted without important discussion.

#### FRIDAY EVENING SESSION

On Friday evening, the fifth session, Gaetano Lanza presented a very comprehensive "Review of the Status of Testing in the United States." Mr. Lanza described the early testing devices, showing their crudeness as compared with present methods, and in reciting dates showed how comparatively recent is the period when the importance of tests began to be more fully recognized. He urged the testing of full sized pieces under the conditions of practice, not only in bridges, buildings and other structures, but also in the various parts of machinery which are subjected to compression. He said that the subject of impact is almost an unexplored field, and another field of the greatest importance which cannot be too strongly emphasized is that of repeated and alternate stresses such as occur constantly in practice. He closed by cautioning that conclusions in the work of metallography be drawn neither too hastily nor upon evidence of an insufficient nature.

William Campbell gave a very interesting address on the "Structure of Alloys." Assisted by the stereopticon Mr. Campbell illustrated a large number of very interesting microscopic specimens, showing the structure of alloys to be composed of one or more constituents, being either pure metals, definite chemical compounds of metals with metals or metals combined with certain new metals; solid solutions of one metal and another, &c.; allotropic modifications of metals or eutectic mixtures. Mr. Campbell closed by stating that the dendrites of metals which crystallize out from alloys nearly always contain a certain amount of another metal or compound in solid solution, although this amount may be extremely small.

"The Effects of Preservative Treatment on the Strength of Timber" was the subject of a very interesting paper by F. A. Kummer, which brought forth a resolution urging Congress to encourage this work through the Department of Agriculture. The resolution was referred to the Executive Committee to be forwarded to the proper authorities.

Samuel Tobias Wagner read a paper on "The Early Use of 60,000-Pound Steel in the United States." He spoke of the growing favor with which the proposition of using a single grade of steel for all ordinary structures, and that grade having an average ultimate tensile strength of 60,000 pounds per square inch, is meeting. He reviewed the early history of this movement and told of the practical difficulties encountered at the outset in obtaining the desired results.

George H. Hull read a paper on "Pig Iron Feasts and Famines; Their Causes and How to Regulate Them." Mr. Hull made predictions of tremendous increases in consumption and production within the near future and told of the advantages of the warrant yard system of anticipating famines during the feast periods.

#### SATURDAY MORNING SESSION.

The sixth session was opened by the reading of the report of J. Walter Esterline, chairman of the Committee on the Magnetic Testing of Iron and Steel. This was followed by the presentation of a paper on "The Commercial Testing of Sheet Steel for Electrical Purposes," by C. E. Skinner. This paper is printed with illustrations in another column. It was received with the greatest interest, as it is the first contribution of its nature ever given to the engineering world. The discussion which followed indicated a high degree of live interest in this topic, and Mr. Skinner was complimented in generous measure for his revelations.

"The Permeability of Cast Steel" was the subject of a paper by H. E. Diller. It was, in part, as follows:

It was formerly thought that pure iron was more permeable than any of the commercial steels, or any special alloy which could be made with iron. This assumption has lately been disputed, and the claim put forth that the addition of silicon, phosphorus and aluminum to steel increase the permeability of the metal. However, at present it is the general rule among foundries making steel castings for dynamos and motors to try for about the following composition: Silicon, 0.10; sulphur below 0.07; phosphorus below 0.07; manganese below 0.05, and carbon below 0.10.

After giving a description and results of an elaborate series of tests, Mr. Diller summarized his conclusions as follows: The normal bar shows as good as any bar of commercial steel I have tested, so in comparing these results with those obtained by other methods it will be well to consider the normal bar as somewhat above the average dynamo steel. The analysis of the normal bar is: Silicon, 0.10; sulphur, 0.06; phosphorus, 0.06; manganese, traces, carbon, 0.09.

The annealing increased the permeability in all the bars, especially in those containing a high percentage of carbon or of manganese, but the increase was much the greatest at the lower densities.

The discussion developed the fact that while in small or light work Mr. Diller's deductions were valuable, in the case of dynamo frames of the larger sizes, where tensile strength is an important factor, conditions are entirely changed, so that mixtures higher in carbon and manganese must be used. Mr. Diller said in this connection that on large work, where the cost is an important factor, a semisteel high in silicon is used to advantage.

A paper by J. P. Snow on proposed "Tests for Detecting Brittleness in Steel" was received with much favorable comment. This was followed by a paper by William R. Webster on "Tests for Detecting Brittle Steel," which was in part as follows:

Most of the steel now made will meet all the requirements of the specifications in general use, with a large margin to spare. This has given a false sense of security and too many chances are being taken. In some cases the cold bending tests have been omitted on boiler steel and the material accepted on the results of tension tests alone. Hundreds of boilers are made every year under these conditions. Every now and then a plate falls in shop work, and samples taken from such plates will generally not bend flat cold, or anywhere near it. We have no means of learning how many other brittle plates,



which do not fall in shop work, are put in boilers. The failures generally occur in thick material, and in most cases the ordinary cold bending test, as called for in our specifications, would have detected the brittleness.

There are other cases where axles, rails, &c., are put in service without any physical tests whatever being made. This is directly contrary to the specifications adopted by this society and the opinions expressed in the discussions at our meetings.

Some think that heat always has a softening effect on steel, as in annealing, and that the hotter the steel is finished in rolling or forging the softer it will be. On the contrary, under such conditions, heat has a hardening effect and is one cause of brittle steel.

The society took a decided step in the right direction in specifying that cold bends shall be made on each heat of steel in the condition it leaves the rolls. This has been more clearly defined by the Committee on Iron and Steel Structures of the American Railway Engineering and Maintenance of Way Association, in their specifications, as follows: "Full sized material for eye bars and other material 1 inch thick and over, tested as rolled, shall bend cold 180 degrees around a pin the diameter of which is equal to twice the thickness of the bar without fracture on outside of bend."

All of our present specifications make concessions in the requirements for the heavy material, and it is a question if we have not gone too far in that direction, as it assumes that such heavy material will, of necessity, be finished at a much higher temperature than the lighter material. It also does not induce the maker to improve his methods.

It will not be necessary to adopt any of the more elaborate tests which have been suggested to detect brittle steel, if the finishing temperature is properly controlled and wide cold bends made of full thickness of material rolled. But in the case of forgings, castings and other very heavy material, annealing will have to be more generally introduced.

#### SATURDAY AFTERNOON SESSION.

The seventh and closing session included the following programme:

Report of the Committee on Standard Tests for Road Materials. Logan Waller Page, chairman.

Tensile Impact Tests of Steel. W. K. Hatt.

The Desirability of a Uniform Commercial Speed for Testing. Paul Kreuzpointner.

Staybolt Iron and Machine for Making Vibratory Tests. H. V. Wille.

A New Chuck for Holding Short Test Pieces. T. D. Lynch.

Bending Moments in Rails. P. H. Dudley.

The most important feature of this session was the presentation of the paper on "The Tensile Tests of Steel," by W. K. Hatt. This was a very comprehensive history of a most painstaking series of tests, and was accompanied by some 15 tables and an equal number of illustrations. The results of these tests led to the conclusion that the ductility and shock resisting capacity of metals of normal quality are not less under impact loading than those disclosed by the static test.

Mr. Kreuzpointner closed his paper with the following summary:

"While we have now an approximately uniform test section, the next step for this society to take would seem to be an endeavor to bring about a uniform rate of speed of commercial testing among producers and consumers for the various structural materials used in engineering practice. To have steel tested at the rate of six minutes at one place, and the same steel at two or three minutes at another place, is neither scientific nor businesslike."

He suggested the appointing of a committee for investigation of the subject of uniform testing speed, to report at the next annual meeting. This suggestion was referred to the Executive Committee.

Interstate lines have established a freight rate of \$6 per gross ton on pig iron in carloads from Texas producing points to Denver, Pueblo and other Colorado common points. This rate is a considerable reduction from the rate heretofore in effect. The tariff was changed for the purpose of enabling the Texas furnaces to compete with

those located in the iron producing districts of the other Southern States. The principal producing points in Texas are Jefferson and Rusk.

#### Osgood Steel Lathe and Planer Guides.

While lathes and planers have been greatly improved and strengthened to meet the modern demands to resist wear in all parts of construction, there has been one point—namely, the carriage guides or V's—which is still a source of annoyance, owing to the tendency of cast iron to wear away rapidly. To a large extent this has been due to the heavy strain produced when taking heavy cuts with the modern high speed tool steels. With a view to correcting this faulty feature, G. L. Osgood of Buffalo, N. Y., has patented and is now manufacturing drawn tool steel lathe and planer guides, which may be inserted

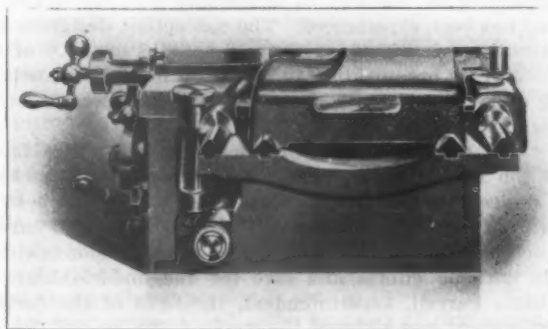


Fig. 1.—Osgood Patent Drawn Tool Steel Guides as Applied to a Lathe Bed.

on new machines or with little expense may be adapted to old machines the guides of which have become worn and defective. These guides are made from high carbon tool steel, are smooth and true and can be furnished in any lengths. They have an accuracy in size within 0.002 inch, and require no machine work except drilling and tapping in order to attach them to the beds. Fig. 1 shows the guides applied to a lathe for the support of the tool carriage, and Fig. 2 the method of attaching. It is claimed for these new guides that they will not bend, grind or cut, and that they have a hard, smooth

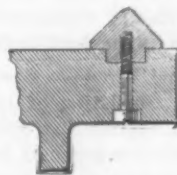


Fig. 2.—Method of Attaching the Guides to the Bed.

surface, which reduces friction and wear. The manufacturer is prepared to furnish these guides to lathe builders, or lathes constructed with the steel guides. The lathe guides are furnished in nine sizes, suitable for use on standard lathes of from 10 to 48 inches swing.

It is proposed to erect an industrial building at Hartford, Conn., for rent to manufacturing concerns who have not the means to build plants of their own, or who wish only a limited floor space. The Hartford Business Men's Association and the Board of Trade are interested in the project. Plans call for a building 50 x 300 feet and four stories. With annexes 72,000 square feet of floor area will be obtained.

Negotiations are pending between the steel works of Upper Silesia and the German Steel Syndicate for the joining of the former. The serious question of allotments is up. The total tonnage is placed at 880,000 tons, of which 65 per cent. is for Group A and the balance for Group B of the syndicate.

## The Pioneer Charcoal Furnace and Chemical Plant.

The Cleveland-Cliffs Iron Company and Pioneer Iron Company, Cleveland, Ohio, have an interesting exhibit, forming part of the State of Michigan exhibit in the Mines and Metallurgy Building, at the Universal Exposition, St. Louis. Included in the exhibit is a model which represents the combined charcoal furnace and chemical plant of the Pioneer Iron Company at Marquette, Mich. From a pamphlet descriptive of the exhibit the following details are taken:

Chemical plants of a similar character for the destructive distillation of wood, and the securing of its by-products, have come to be regarded as a necessary adjunct of modern charcoal furnace practice, but, in all cases except this, they have been built entirely distinct from the furnace plant, and consequently no reciprocal advantage in the way of economies in labor, steam or fuel has been experienced. The conception, designing and execution of this plant form a notable instance of the work of an organization in which an intimate knowledge of every feature was possessed by some member of its regular staff.

Wm. G. Mather, vice-president and the active factor of the Pioneer Iron Company, had long since cherished a desire to combine in a plant of this kind the best results of many years of practical experience and careful research, and it stands to-day a working monument of his untiring efforts and love for the undertaking. To Austin Farrell, superintendent, the head of the furnace department was assigned the work of placing each feature in the hands of men capable in their respective lines, of conferring with them step by step as to design, proportion and practicability, and finally to assemble their work into a well balanced, harmonious whole. In this he was ably assisted by Dr. E. J. Hudson, chemist; George J. Slining, chief engineer, and T. H. Noble, superintendent of lands and fuel, all members of his regular executive staff.

The design of the furnace proper and its immediate accessories is the work of the specialists in furnace engineering, Frank C. Roberts & Co. of Philadelphia, in conjunction with Mr. Farrell and Mr. Slining. Thus it was in the light of many years of experience, and with a staff of men skilled in their respective vocations, that the owners undertook the construction of a plant which should have its boilers, pumps and motive power centralized, and each should represent the highest degree of perfection known to modern engineering.

### The Blast Furnace Equipment.

The boiler plant, consisting of 12 water tube boilers of the Stirling type, aggregating 3600 horse-power, is so arranged that the furnace gas may be consumed under a portion of them according to its volume and fuel value. There are times in the working of every charcoal furnace when these gases are more than sufficient to supply the needs of the furnace proper, and when such is the case this chemical plant gets the benefit of the excess. The noncondensable gases, coming from the kilns through a gas main, are also handled under these boilers. Tar, which has been separated by gravity from the pyroligneous acid, is led to the boilers through brass pipes, to be used at intervals when the gases of either kind are least efficient, and its high value as a fuel makes itself felt immediately on its application.

Eight of these boilers are equipped with the Murphy automatic stokers, which, with their train of receiving hopper, coal crusher, elevators, conveyors and overhead magazine, reduce the labor of firing to a minimum. The ash drops into hoppers, which spill into dump cars, and is finally elevated into a storage bin, whence it is loaded into side dump cars to be used where needed for filling. The charcoal breeze, of which there is a considerable amount, is mixed with the crushed bituminous coal and plays no insignificant part in the general economy.

Another and a very important factor in this economic scheme is the robbing of the off heat from the boilers—which ordinarily goes to the smoke stack at a temperature of, say, 500 degrees F.—by the medium of the Green

economizers, and imparting it to the boiler feed water, raising it to a temperature of 270 degrees F., as against 180 degrees F. usually obtained by other methods. In connection with the Green economizers is the Sturtevant induced draft system, which enables the operator to regulate the draft with nicety at all times.

The furnace stack, which is 70 feet high and has a bosh 12 feet in diameter, is in all respects a model of modern furnace engineering. It is equipped with the Farrell patent bosh jacket, which has proved so successful at Gladstone, Mich., where that furnace is now working on her fifth year of the second blast. This stack has a working capacity of 130 tons per day.

Three Cowper-Roberts brick stoves, each 16 x 70 feet, preserve a very uniform temperature for the hot blast (of 1250 degrees F.), which has been found entirely adequate under all conditions, the average pressure being 8 pounds.

The disconnected, cross compound, Southwark blowing engine has a high pressure cylinder 22 x 36 inches, a low pressure cylinder 46 x 36 inches and two air cylinders 48 x 48 inches. In the same room with the blowing engines are two complete compound Westinghouse generating outfits, direct connected, each having a capacity of 150 kw.

Communicating with this room by open arches, and on a lower level, is the pump room, which contains three Prescott triple expansion pumps, each having a capacity of 5,000,000 gallons in 24 hours. Two of these pumps are working continuously to supply the furnace and chemical works with cooling water, while a third is kept in readiness for emergencies. The daily requirement for the furnace is 2,000,000 gallons and for the chemical works 8,000,000 gallons. Two compound boiler feed pumps and the high duty pumps, which supply the cooling water for the head of the stack, are also in this room. A Weiss condenser, with a capacity of 21,000 pounds of steam per hour, forms a central condensing plant for all the steam engines on the place.

The stock house for ores and limestone, 100 x 300 feet, is a combination of wood and steel construction, capable of being completely inclosed in periods of extreme weather, which is very essential in a Northern climate. Of the two trestles running its entire length, one is arranged for dumping ores on a cement floor, which is circumscribed by a track on which runs the electric motor and charging car, and the other carries center dump ore cars over a system of steel bins on the furnace side of the stock house.

It may be said in this connection that the serious question of ores freezing in such bins has been successfully solved by Superintendent Farrell, who by a simple and inexpensive device has operated them throughout the past winter, when temperatures of from 4 to 30 degrees below zero prevailed much of the time.

An electric charging car receives ores and limestone from these bins in charges accurately weighed by the scale which it carries, transfers the stock to the foot of the incline and side spills it into the self dumping skip, which carries it to the top of the furnace. Twenty pounds of clean, dry, hardwood charcoal is used as a standard bushel, and buggies each holding 20 such bushels are taken into the kilns, filled by the coal forkers, then wheeled on cars, and an electric locomotive brings them into the stock house, where the charcoal is spilled into the same skip which carries the ore. Thus no buggies, either for ore or charcoal, are sent to the top of the furnace, and the operator of the charging car and the cager take the place of the large gang of bottom fillers to be found on the floor of the stock house of every other charcoal furnace.

The plant is furnished with a most complete system of tracks, aggregating about 3½ miles. The general scheme contemplates the incoming of all trains from the north and the outgoing of all empty and loaded cars from the south, thus eliminating congestion and conflict of traffic. Filled approaches and standard trestles carry ores, cordwood, limestone and burnt lime to elevations best suited to cheap handling, and so completely is every building and process supplied with tracks that, outside of the horses which take away the slag and coal breeze,



none are used. One 40-ton switch locomotive receives all cars from the railroad companies, supplies every process on the location and delivers trains ready to be taken away.

#### **The Charcoal Kilns.**

The battery of 86 kilns, each holding 80 cords of wood, is arranged along the lines of two standard trestles, which carry the carloads of cordwood as they are received from the operations of the company along the line of the Munising Railway, the spacing, both vertically and in plan, being with special reference to the cheap handling of cordwood.

The owners did not adopt the kiln system for carbonizing wood until they had made an exhaustive study of all other known methods and conducted an elaborate series of experiments. The deduction was that in the absence of natural gas, saw mill refuse or other very cheap fuel this factor alone would condemn any form of retorts. Adding to this the difficulty of preparing enough wood in suitable form, the skilled labor required, the enormous investment and the high cost of maintenance which they entail, the supplying of a furnace of this size entirely with retort coal was not considered advisable.

The daily requirement in cordwood is 20 carloads, of 16 cords each, this being first unloaded into the kilns and then packed snugly in ranks by 20 men. Assuming a weight for the cordwood of 4500 pounds per cord, each man handles as a day's work 32 cords, or a total weight of 144,000 pounds, or 72 net tons. There is no other situation in the cordwood business where one man can handle so large a cordage as a day's work.

The kiln packed full of wood, fire is introduced in the circular opening at the apex of its dome, and as soon as it gains sufficient headway this opening is closed, and the smoke generated escapes by way of the flue leading from the base of the kiln communicating with its chimney. This process continues until the aqueous vapors have largely escaped into the air and the gases generated are deemed of sufficient value to warrant their condensation. At this stage the top of the chimney is closed and a damper is opened which completes the communication from kiln to condensers through the medium of the smoke main.

At the condenser end of the smoke main electrically driven fans induce a gentle draft on the kilns, as well as subjecting the gases to a slight pressure while passing through the condensers, and it is this contact of the gases with the cold surface of the copper tubes of the condenser which precipitates the condensible properties of the gases, the noncondensable portion going to the boilers to be burned as fuel, as already described.

#### **The Chemical Process.**

It will be a revelation, perhaps, to the uninitiated to learn that the liquor product of the condensable gases from one cord of wood amounts to about 224 gallons, of more than the contents of four large kerosene barrels. This liquor, which is known in the industry as green liquor or pyroligneous acid, is largely made up of water, but carries alcohol, tar, ammonia compounds, acetone (alyl-alcohol, ethers, aldehydes) and acetic acid, the alcohol, acetic acid (as acetate of lime) and formaldehyde being the only commercial products secured at this plant.

The heavier elements of tar, which would be very objectionable in subsequent processes, are separated by gravity in liberal settling tanks placed at a suitable elevation, whence it is sent to a higher elevation to be injected by steam as a spray under the boilers and used as fuel.

The liquor which remains in the settling tanks is of large volume, and the elevating of this material involves the expenditure of considerable power. For this reason the designers of other plants have sought to raise the liquor but once in the process, and thereafter to maintain desired elevations by the rising of vapors or by gravity, but this idea necessitates the placing of the first system of stills—the primaries—at some height, and a consequent increase in the height and cost of the building which contains them. In the case before us the engineers have made use of a source of power which had before been

overlooked—namely, water power obtained by installing turbines and using the overflow water from the condensers. Having this power, the designers were able to carry out certain economic schemes which would not have been warranted without it. It is usual to assemble stills of all kinds in one building, but in this case the distilling of the pyroligneous acid and the neutralizing of the distillate with milk of lime are conducted in the primary still house, which is designed especially for these processes.

By reason of the acid character of the material to be distilled these stills are made of heavy copper, and make up a considerable per cent. of the cost of a plant of this kind. The function of primary stills is to throw over, to be condensed, vapors of alcohol and acetic acid, both of which are more volatile than water (though a very considerable amount of water vapor passes over with them), and leaving behind, as a residuum, water containing tarry products and coloring matter, the condensed product of the still being correspondingly lessened in volume and raised in strength of alcohol and acid.

The neutralizing tanks receive this product, which is vigorously agitated by vertical shafts bearing wings and connected with water power, while the milk of lime is being introduced. The result is an intimate chemical union between the acid and as much of the oxide of lime as it is capable of carrying, and finally a perfectly neutralized mixture.

This neutralized liquor is now allowed to settle, all excess of oxide of lime, and some foreign material, depositing itself on the floor of the tank as core, and the brilliant claret colored portion is sent to the refining still house for further treatment. The business of this house is to further eliminate water and the lighter oils which are very persistent, carrying coloring matter and objectionable odors, and finally to produce a 95 per cent. methyl alcohol which shall be free from objectionable odors and shall be permanently water white.

The stills which are employed to produce this result are termed intermediate or lime-lee stills and refining stills. The accessories of such stills are many and varied. A condenser in some form is common to all of them, but the appliances for eliminating the water and saving the valuable alcohol may take the form of the goose, the pans, or series of pans, arranged in a great variety of combinations in columns of various designs. Whatever form these appliances may take the governing principle is that of fractional distillation.

By the operation of the intermediate or lime-lee stills the acetic acid combined with lime was left behind to be treated for acetate of lime, and the distillate known as crude alcohol remains to be refined. Both in the intermediate and refining processes advantage is taken of the physical law that alcohol is more volatile than water, and that if the goose, the pans or the columns are kept at a certain temperature the alcoholic vapors will remain as vapors and pass over to the condenser, while the aqueous vapors will be condensed and returned to the still as water. This is what is meant by fractional distillation, a principle which is employed wherever the recovery of alcohols, whether of the methyl or ethyl group, is the object.

#### **General Information.**

The visitor may be interested by a study of the graphical exhibit of what may be produced from a given amount of wood, iron or and limestone used as a flux.

The log of hard maple represents in quantity just one-sixteenth of a cord of wood. Its equivalent in charcoal obtained by this process is 55 pounds. The quantities of by products obtained from this amount of wood are as follows: 13 gallons of pyroligneous acid,  $\frac{1}{2}$  gallon of wood tar, 4 pounds of gray acetate of lime and  $\frac{1}{4}$  gallon of 95 per cent. refined wood alcohol.

Reverting to the 60 pounds of charcoal, if this be used as a fuel to smelt the 120 pounds of lake ore and the 30 pounds of Cliffs-Shaft ore in mixture, and 4 pounds of limestone as a flux, there will be obtained 78 pounds of charcoal pig iron, as represented by the exhibit, and 15 pounds of furnace slag.

Memoranda relating to the operations of the Cleveland

Cliffs Iron Company, Pioneer Iron Company and their allied interests:

|   |            |
|---|------------|
| Iron ore mined in 1903, gross tons.....                   | 1,649,567  |
| Total mined up to 1903 (about), gross tons.....           | 18,000,000 |
| Charcoal pig iron made in 1903, gross tons.....           | 81,444     |
| Charcoal pig iron made 1854-1903 (about), gross tons..... | 721,000    |
| Wood alcohol made in 1903, gallons.....                   | 446,423    |
| Acetate of lime made in 1903, net tons.....               | 3,000      |
| Miles of standard gauge railroad operated.....            | 228        |
| Tons carried in 1903 on railroad operated.....            | 2,212,219  |
| Ships owned, steam and sail.....                          | 8          |
| Gross tons freight carried.....                           | 481,392    |
| Average men employed 1903.....                            | 3,500      |
| Average wages at mines, per day.....                      | \$2.21     |
| Average wages on vessels.....                             | \$2.23     |
| Average wages at furnaces.....                            | \$2.20     |
| Acres of land owned and controlled.....                   | 1,400,000  |

All of the iron ore and the wood used by the Pioneer Iron Company are furnished from the mines and lands of the Cleveland Cliffs Iron Company and over the railroads owned or controlled by the same interests. The officers are as follows: Wm. G. Mather, president and treasurer; J. H. Wade, vice-president; J. H. Sheadle, secretary, and R. C. Mann, auditor, all of Cleveland, Ohio; M. M. Duncan, agent department mines and minerals, Ishpeming, Mich.; Austin Farrell, manager furnace department, Gladstone and Marquette, Mich.; Samuel Redfern, agent land department, Negaunee, Mich.; H. R. Harris, general manager Lake Superior & Ishpeming Railway Company, Munising Railway Company, Marquette & South-eastern Railway Company, Marquette, Mich.

The following statement shows the various grades of iron ores produced by the Cleveland Cliffs Iron Company and the average of all the analyses made during 1903, when dried at 212 degrees:

|   | Iron. | Phos-<br>phorus. | Silica. | Man-<br>ganese. | Alum-<br>ina. | Mag-<br>nesia. | Lime. | Sul-<br>phur. | Organic<br>or<br>volatile. | Free<br>mois-<br>ture. |
|---|-------|------------------|---------|-----------------|---------------|----------------|-------|---------------|----------------------------|------------------------|
| <i>Bessemer ores:</i>   |       |                  |         |                 |               |                |       |               |                            |                        |
| 1. Lake Bessemer. Soft hematite.....                                    | 63.44 | 0.0389           | 5.55    | 0.240           | 1.53          | 0.110          | 0.230 | 0.009         | 1.30                       | 10.99                  |
| 2. Abbotsford. Red specular (crushed).....                              | 62.80 | 0.0263           | 6.37    | 0.100           | 1.50          | 0.120          | 0.320 | 0.010         | 2.30                       | 1.56                   |
| 3. Ashland. Soft hematite.....  | 60.39 | 0.0397           | 6.53    | 0.250           | 3.13          | 0.090          | 0.130 | 0.012         | 3.03                       | 10.59                  |
| 4. Taylor. Soft hematite.....   | 58.50 | 0.055            | 9.18    | 0.240           | 3.77          | 0.230          | 0.250 | 0.014         | 2.41                       | 10.85                  |
| 5. Negaunee-Bessemer. Soft hematite.....                                | 60.30 | 0.057            | 7.25    | 0.350           | 2.77          | 0.520          | 1.000 | 0.020         | 1.90                       | 10.12                  |
| <i>Non-Bessemer ores:</i>   |       |                  |         |                 |               |                |       |               |                            |                        |
| 6. Lake. Soft hematite.....   | 60.30 | 0.110            | 5.64    | 0.470           | 2.43          | 0.380          | 0.430 | 0.011         | 3.45                       | 11.66                  |
| 7. Salisbury. Soft hematite.....  | 60.30 | 0.095            | 6.71    | 0.250           | 2.90          | 0.800          | 0.500 | 0.010         | 1.95                       | 11.64                  |
| 8. Bedford. Soft hematite.....  | 59.60 | 0.110            | 8.25    | 0.360           | 1.52          | 0.470          | 0.450 | 0.012         | 2.42                       | 10.93                  |
| 9. Cliffs shaft. Red specular (crushed).....                            | 62.60 | 0.102            | 4.29    | 0.180           | 2.09          | 0.570          | 0.750 | 0.016         | 0.820                      | 0.85                   |
| 10. Cliffs shaft. Red specular (selected lump).<br>For open hearth..... | 63.40 | 0.116            | 4.25    | 0.190           | 2.23          | 0.700          | 0.930 | 0.019         | 0.900                      | 0.38                   |
| 11. Scotch. Red specular.....   | 61.70 | 0.134            | 6.70    | 0.120           | 2.60          | 0.560          | 0.450 | 0.014         | 0.350                      | 0.79                   |
| 12. Castleford. Red specular (crushed).....                             | 55.58 | 0.087            | 16.22   | 0.120           | 2.04          | 0.250          | 0.280 | 0.008         | 0.550                      | 0.87                   |
| 13. Imperial. Brown hematite.....                                       | 52.44 | 0.256            | 13.49   | 0.198           | 1.20          | 1.390          | 1.370 | 0.011         | 7.38                       | 10.32                  |
| <i>Siliceous ores:</i>  |       |                  |         |                 |               |                |       |               |                            |                        |
| 14. Chatford. Soft hematite.....  | 51.40 | 0.122            | 20.93   | 0.330           | 1.39          | 0.120          | 0.500 | 0.013         | 3.61                       | 8.80                   |
| 15. Tilden silica. Hard hematite.....                                   | 41.50 | 0.040            | 37.25   | 0.270           | 0.85          | 0.110          | 0.430 | 0.009         | 1.17                       | 1.34                   |

### Lake Iron Ore Matters.

DULUTH, MINN., June 20, 1904.—All mines of the United States Steel Corporation which will move any considerable quantity of ore this year are now sending to docks, and all the roads running to shipping ports on Lakes Superior and Michigan are putting on their extra crews. But none of the mines have yet reached regular production on the scale they will maintain for the season, as boats are not coming with sufficient regularity. It is probable that the ore movement of the season will be on about the same scale as through the greater part of last year, for the loss of two months at the beginning of the year makes up for the probable decrease in tonnage to be furnished. Mines operated independently are not, in most cases, running as heavily nor as completely as are those of the Steel Corporation. Some operators are not yet decided as to what they will do this year, others are moving quite slowly still.

At Chapin mine, Menominee range, the tramming system is being changed from chain to electricity, and for a short time the output will be diminished. The Oliver Iron Mining Company have taken a lease on McGillis mine in Stambaugh, paying \$20,000 for the option. It is some time since any mines have been taken under lease, and any indication of a change is welcomed. The

Oliver Company have been exploring this property for nearly two years, and have sunk a shaft several hundred feet and opened considerable ore. The mine will probably be a shipper the coming year.

On the Gogebic range there is little change in conditions. At Bessemer, Yale mine is about the most promising small property. It has been under exploration for some time and has opened considerable ore. Colby, Anvil, Iron-ton and Tilden are working, though the last named with small forces.

### An Ore Crushing Plant at Escanaba.

The Oliver Iron Mining Company last year started construction of a large ore crushing plant at Escanaba, to be a central crusher for the mines shipping to that port. It was planned to erect a second plant of the same character at Two Harbors, for what ore came from Minnesota properties requiring crushing. The work at Escanaba was carried on during the fall of 1903 and stopped for the winter. Recently it has begun again, and the first half of the crusher will go into commission in a few days. It was designed as a double plant, one side to crush coarse sizes and the other fines. The fines side will not be completed this year. The coarse side consists of one No. 9 Gates gyratory crusher, set in a deep pit, over which run standard gauge tracks carrying ore cars from the mines. Cars will dump into a pocket over the machine and ore is fed down by Mason & Hoover pocket discharge rolls. After crushing the ore will be elevated to pockets 60 feet further along the main track by means of a wide belt conveyor set at 18 degrees. In practice, the ore car from the mine will be set over the crusher pocket, dumped and then permitted to run along to beneath the

crushed ore receiving pocket, where it will be again loaded and will move forward 5000 feet to the shipping docks. Tracks are arranged on a 1 per cent. grade, so that the cars will run by gravity to the first pocket and on to the second. This plant will handle about 250,000 tons a year.

The second side of this crusher plant will consist of another No. 9 Gates, to which are attached two pairs of 36-inch rolls. Ore as it comes from the cars will pass over screens, and the fines go to shipping pockets, coarse to the rolls. After roll crushing, the fines will be elevated to the same shipping pockets. The shipping pockets will discharge by the same automatic device as is used for feeding the Gates machines. All processes at the plant will be automatic, so that costs will be reduced to a minimum. Power required for the coarse plant has been installed and is running. It consists of a 250 horsepower Russell four-valve compound condensing engine, furnished steam by a Wickes vertical water tube boiler. The fine crushing side will require 450 horse-power.

### Steam Power on the Minnesota Ranges.

Some interesting figures as to horse-power of steam plants on the two Minnesota iron ore ranges have just been compiled for private use. These show that, including all mines on both ranges equipped with steam for any purpose, underground or open pit, there are 48,000 horse-



power now installed. A similar report made 18 months ago gave a total of 30,000 horse-power; the increase was during the first 12 months of the time since the initial report, for there has been little addition to equipment since last fall, and that the steam power on these ore ranges was nearly doubled in a year shows how great was the activity in new mines for that period.

In connection with these figures some additional information along the same lines will be pertinent. Stripping contractors on the Mesaba have 5500 horse-power of steam shovels and attendant locomotives, with a total of 21 shovels. Mining companies on the same range have 24 shovels, used mainly for stripping on their own account, and 42 shovels for mining in open pits and loading from stock piles. There are five shovels in use on the Vermillion range, all for loading stocks. The leading mines, so far as power is concerned, are Mountain Iron, Fayal and Adams, with 2400 to 2100 horse power. The standard shovel is about 65-ton, the largest in use 110-ton.

D. E. W.

### The Westinghouse Companies at St. Louis.

The main service plant at the Louisiana Purchase Exposition, for which the Westinghouse Electric & Mfg. Company received the general contract, is naturally a notable feature of the Westinghouse exhibits, and one which appeals, because of the commanding size of the four big electric generating units, each of 2000 kw. capacity, and their location in the central aisle of Machinery Hall, to practically all visitors to the fair. Popular recognition of the all important part played by electricity in recent years in the mechanical and artistic development of the modern exposition has inevitably increased the general interest in all machinery displays, and especially in the large electric generators which are found in a great exposition's central station.

The total space devoted to the service electric plant in Machinery Hall, with the exciter units, condensers, cooling towers and the 35-panel switchboard, is 26,260 square feet. The entire steam and electric station was designed and equipped by Westinghouse, Church, Kerr & Co., and all the motive power apparatus in connection with the generators, and in the steam generating plant in the nearby boiler house, was furnished by the Westinghouse Machine Company. The electric plant, although within the Westinghouse walls at the west end of Machinery Hall, has not been laid out on elaborate lines to combine the diverse characteristics of exhibition and service, and is an exhibit plant only in so far as it is representative of thoroughly modern practice at minimum cost. The various organizations associated with the Westinghouse name, which have united in representation at St. Louis under the title of the "Westinghouse Companies at Louisiana Purchase Exposition," are as follows:

Westinghouse Electric & Mfg. Company.  
Westinghouse Machine Company.  
Westinghouse Air Brake Company.  
Westinghouse, Church, Kerr & Co.  
Westinghouse Brake Company, Limited, London, Paris and Hanover.  
British Westinghouse Electric & Mfg. Company.  
Westinghouse Automatic Air & Steam Coupler Company.  
Westinghouse Traction Brake Company.  
Canadian Westinghouse Company, Limited.  
Société Anonyme Westinghouse, Havre, France.  
Société Anonyme Westinghouse, St. Petersburg, Russia.  
Westinghouse Electricitäts-Actiengesellschaft, Berlin.  
Sawyer-Mann Electric Company.  
Union Switch & Signal Company.  
American Brake Company.  
Nernst Lamp Company.  
Pittsburgh Meter Company.  
R. D. Nuttall Company.  
Cooper-Hewitt Electric Company.  
Bryant Electric Company.  
Perkins Electrical Switch Mfg. Company.

In Machinery Hall, in addition to the electric service plant and the main exhibit of Westinghouse gas engines, turbo-generators, rotaries, exciters and motors in operation, all inclosed within ornamental staff walls and columned entrances of classic design, is the Westinghouse auditorium, which seats 350 persons, in which are displayed at regular hours through the day the biograph and

mutoscope pictures of scenes in and about the various Westinghouse works in the Pittsburgh district, including the first interior photography of the kind ever taken by means of the Cooper-Hewitt mercury vapor lamp. Through the courtesy of the companies this auditorium, which is of ornate architectural design, rendered cool and comfortable at all times by a ventilating system which provides a continual supply of pure air, and brilliantly lighted by the four principal systems of electric illumination, will be used throughout the fair as a meeting place for scientific societies and technical congresses. The lighting of the hall is with the incandescent lamps of the Sawyer-Mann Electric Company, Bremer arc lamps, Cooper-Hewitt mercury vapor lamps and the Nernst glowers, all of which are used extensively throughout the Westinghouse display.

The Cooper-Hewitt lamps, which made possible the Westinghouse mutoscope shop views, one of the distinct novelties of the fair, are shown in the booths in Machinery Hall and the Palace of Electricity, as designed for use in general illuminating, photographing and photo-engraving, with samples of work by some of the best operators in the latter lines. The lamps are also used in an illuminated sign of the Robins Conveying Belt Company and in various other exhibits, and never fail to excite comment. There are in all about 10,000 Nernst glowers in use in the exhibition buildings, 6000 of them in the Fine Arts Museum. The handsome Illinois State Building is lighted by them, the National Cash Register Company use the glowers in their three displays in the Liberal Arts, Electricity and Education buildings, and the Westinghouse Companies use 300 big street glowers in their exhibits. It is interesting to recall that the first public appearance of the Nernst lamp in any considerable number was only three years ago, at the Pan-American Exposition.

On exhibition or in service the Westinghouse Companies have installed within the exposition grounds 14,000 horse-power in generating machinery and 30,000 horse-power in other apparatus.

The Sawyer-Mann Company's display of various types and sizes of incandescent lamps is in the general Westinghouse exhibit space in the Palace of Electricity. There, also, the Bryant Electric Company show a variety of lamp sockets, receptacles, switches and other products, including details manufactured by the Perkins Electrical Switch Mfg. Company. The R. D. Nuttall Company's exhibit of cut and planed gears, trolleys, trolley gears and pinions for electric railway, mine and industrial haulage motors is in Machinery Hall, near the Westinghouse headquarters.

The Pittsburgh Meter Company have a separate booth in block 35 of Machinery Hall.

Steam for the Westinghouse electric service plant is piped from the boiler house, known as the Steam and Fuels Building, nearby, in which there has been installed under the direction of the same engineers and contractors a large battery of Babcock & Wilcox water tube boilers built into a single setting, with a total capacity of 6400 horse-power. Equipment here includes also Roney mechanical stokers at the furnaces, operated by Westinghouse standard steam engines, a complete coal conveying system furnished by the Link Belt Engineering Company, Cochrane feed water heaters, Worthington steam pumps, mechanical draft, condensers, cooling towers and other apparatus to be found in a modern station. The auxiliary apparatus in the electric plant includes three 80-kw. direct current 125-volt direct connected engine driven exciter units, two of which are sufficient to operate the entire plant and adjacent auxiliary machinery in the exhibit sections. Each of the four chief generating units receives steam from a separate line, supplied by a separate battery, the entire plant thus consisting of two sections, which may be operated independently or together.

The exhibit service plant, immediately west of the companies' headquarters, is utilized to furnish power for various purposes, and includes a Westinghouse-Parsons steam turbine generating set of 400 kw. capacity, operating at a speed of 3600 revolutions per minute, and delivering a three-phase 60-cycle current at a potential of 440 volts. This plant contains also a 125 horse-power

vertical and a 225 horse-power horizontal gas engine, the first direct connected to standard two-wire, the second to standard three-wire, double voltage direct current generators. Both single acting and double acting types of gas engines at present manufactured by the Westinghouse Machine Company are here represented in their latest form.

An important part of the Westinghouse installation which is seen by few is the pumping apparatus under the beautiful Cascades in front of Festival Hall. This equipment was designed to supply 90,000 gallons of water a minute for these Cascades, by three large centrifugal pumps, each driven by a 2000 horse-power Westinghouse induction motor, probably the largest motors ever constructed.

In the Palace of Electricity the Westinghouse Electric & Mfg. Company occupy a space of over 10,000 square feet, including 1600 square feet devoted to the display of electric trucks and locomotives constructed in conjunction with the Baldwin Locomotive Works. Two locomotives built for mine service are shown, one weighing 20,000 and the other 30,000 pounds, each equipped with two No. 79 motors at 500 volts. Another 20,000-pound locomotive for switching is equipped with two No. 75 motors at 220 volts. The spectacular high tension sign, using a potential of 50,000 volts, which spells the name "Westinghouse" in lightning like discharges radiating from large letters over a plate glass surface—one of the attractions at the Pan-American Exposition—is to be seen in the Westinghouse auditorium.

The Westinghouse Air Brake Company's exhibit shows a rack made up of apparatus constituting the equipment for a six-coach passenger train with engine and tender, all fitted throughout with the high speed brake and signal equipment. The engine and tender are equipped also with the combination automatic and straight air brake which is now so much in use. The method at present generally adopted when two pumps are used on one locomotive is shown, and one of the novel features of the rack is that all valves are placed in duplicate, one sectioned so as to show the internal working mechanism, and connected to the valve in use in such a manner that it moves as the regular valve is operated. The operation of the various valves is thus readily studied.

The Westinghouse friction draft gear also is shown in section, with a machine especially designed for testing it in operation. The available power which can be exerted on the draft gear approximates 2000 pounds. A triple valve testing rack is presented to show the manner in which this device is now being installed in many railroad shops.

In the exhibit of the American Brake Company is shown a model of the outside equalizing brake for locomotives and the American automatic slack adjuster. The Westinghouse Automatic Air & Steam Coupler Company show the ends of two freight cars fitted as movable models to show the operation of the device in actual practice. This also is shown on two small models fitted with air and steam and signal coupler. Under this model is another working model of the magnetic brake, arranged to show the operation of the device.

The Union Switch & Signal Company's exhibit is a group of signals, full size and in working condition, erected in the Transportation Building.

The Seamless Rolled Steel Pipe Company, Chester, Pa., have issued a handsomely printed prospectus, in which they set forth their plans for the erection of a mill for the manufacture of steel pipe under the patents of W. F. Bartlett of Philadelphia and E. C. Kent of the Philadelphia Roll & Machine Works. The company are offering for sale \$500,000 30-year 5 per cent. first mortgage sinking fund bonds. The bonds are offered at par and carry with them 25 per cent. of their value in the capital stock of the company. E. C. Kent is president; William H. Green, Jr., of the Vulcan Works, Chester, is general manager; John Roberts, Philadelphia, is treasurer, and Edward J. Altemus, Philadelphia, is secretary. The prospectus gives a full description of the Bartlett-Kent process for rolling seamless pipe, reprinted from *The Iron Age*.

## The Influence of Specifications on Commercial Products.\*

BY C. B. DUDLEY, ALTOONA, PA.

We are frank to say that it is our firm belief that the influence of the consumer on commercial products is far greater than is commonly supposed. We are so accustomed to regard the great mass of commercial products as so completely in the hands of the producer, as a something that the consumer is quite at liberty to take up or let alone as suits him, and as something in whose preparation he, the consumer, has had no voice, that the idea that the consumer does actually have an influence on, or exert some force in, giving shape and form, or in deciding on the qualities which the article shall possess, does not seem evident at first sight. And yet we do not hesitate to reaffirm that the influence of the consumer appears in every successful commercial product, however great or however small, and that the consumer's power over the product, although perchance not appearing in formal and carefully prepared specifications, is nevertheless many times fully as great, or even greater, than that of the producer.

In staple articles of almost universal use the silent influence of the consumer on the product is granted. He would be a short-sighted producer who would attempt to ignore the demands expressed or understood, nay, even the foibles of the consumer, or what amounts to the same thing, would not study his market. But there are cases, such as the making of a new product for which a demand has yet to be created, where the influence of the producer on the product covers the whole field. The consumer does not yet understand the new product, does not yet know what kind of a material it should be, and hence can have no voice in its production. Take for an illustration the new high speed tool steel. The manufacturer seemingly decides everything in regard to this new product independent of the consumer. He first learns how to make the steel, decides what its composition should be, learns how to treat it, practically changes all our ideas as to what heat will do to a piece of steel, and develops a new art of hardening and tempering, and, after his studies are finished, comes forth with his creation and teaches the consumer how to use it. Surely it may be urged, in such a case as this, that the influence of the consumer on the product is not apparent. But those who so argue we fear can have had very little experience at the birth and death of new things, many of them good new things which might have had perchance a long life of usefulness if their sponsors had not attempted to ignore the legitimate influence which the consumer has on even new commercial products, the fruit apparently of the brain energy of the producer alone.

### Causes of Failure of New Commercial Products.

The influence of the consumer on a new commercial product is usually made manifest in the price he is willing to pay for it. If the new product is higher in price in proportion to results obtained than that which he is at present using, or if, even though economies are shown, he conceives that the price is unreasonable, he will usually go on as he has been doing in the past, with the result that the new product fails to be successful. Makers of new things far too often make one or both of two serious mistakes: They either fail to sufficiently study the present condition of the field which their new product proposes to occupy, and as a consequence make the product cost so much to manufacture that it cannot successfully compete with what is already in the field, or having studied the field carefully and thoroughly, and having developed a new product which is a decided step forward over present practice, and which produces notable economies, they place a price on their product such that the ultimate economy to the consumer is so small that there is no real reason why he should change. Not once, but scores of times, have we seen new commercial products fail from one of these two causes. The man who fails to study his field and makes his product cost too much should have our pity for his short-sightedness. The man

\* Presidential address before the Atlantic City meeting of the American Society for Testing Materials.



who, having devised and worked out something new which may be actually useful and valuable, and who claims for himself all the financial advantage of the step forward will find, if our observation and experience are worth anything, that he is killing the goose that may lay golden eggs for him, and that the disappointment which will inevitably follow his action is no more than a just punishment for his attempt to ignore the right of the consumer to a share in the advantage which comes from the progress of knowledge.

Thus far we have considered the influence of the consumer, which is, so to speak, not expressed. It is a silent influence, an unwritten specification, one real and tangible in its effects, but which has never attained to the dignity of being expressed in words or print. But our real theme is the influence of carefully worked out written or printed specifications, which are rigidly enforced on commercial products.

#### The Adoption of Carbon Limits.

No individual specification, but, rather a group of specifications, will be considered. For our purpose it will be sufficient to choose out from the innumerable uses of steel three grades, soft, medium and hard. Let the boiler and fire box steel specifications represent the first, the axle and crank pin specifications represent the second, and spring steel specifications the third. Now, it is well known that the grades of steel defined by these specifications differ from each other principally in the amount of carbon which they contain. The limiting amounts of the other constituents are, of course, not all alike, but the principal difference making the various steels applicable to their designed use is in the carbon, approximately 0.18 of 1 per cent. for boiler and fire box steel, 0.45 of 1 per cent. for axles and crank pins, and 1 per cent. for spring steel. When these specifications were first drawn some of them provided only for physical tests, some for chemical tests only, and some for both. Whatever the method of testing the shipments, however, when the specifications were first made they provided only lower limits—that is to say, in fire box steel a minimum tensile strength and a minimum elongation were specified. The manufacturer might furnish a product as much above these minimum limits as he chose. Exactly the same restrictions applied to the axle and crank pin steel. In spring steel a minimum content of carbon was given with no upper limit. Two or three reasons led to this procedure. First, there was the desire to leave the maker the widest possible freedom in the manufacture of the material; second, there was at that time no known reason why there should be any upper limit, and, third, it was actually thought that a minimum limit in strength and elongation being secured, or a minimum amount of carbon, the product would really be better the more these minimum limits were exceeded. But as time progressed, and especially as the study of parts that had actually failed in service—that never ending source of valuable information—became wider and wider, it began to appear that an upper limit likewise was a desideratum in specifications. The boiler plate sent where there was no upper limit occasionally gave difficulty in the shops in flanging, cracking at the bends, and an analysis and physical test of such plates demonstrated beyond question that the carbon and tensile strength were too high for successful hand flanging at such temperatures as are usually employed in this operation. Axles and crank pins which, under the slow moving strain of a tensile test or under the drop test as then carried out, would quite fill the requirements, would not infrequently fail in service, either by breaking in detail or, as the analysis would frequently show, due to an improper proportioning of the chemical constituents. Spring steel with a lower limit of carbon only would occasionally fail in service, owing to apparently overhardening with the very high carbons, or would give difficulty in the shops when working it, owing to the wide range of carbon in a shipment. Moreover, as the knowledge of the influence of carbon, and especially of manganese and silicon, on the physical properties of steel increased, and especially once again as the analysis of parts that had either broken or failed in some other way in service, or had given difficulty in the shops, began to increase and become an element in

the making of specifications, it became evident that the chemistry of steel was destined to play a continually more and more important part in obtaining a metal that would give best results. Accordingly, it was decided to revise existing specifications, and introduce both an upper limit in tensile strength, and also as much chemistry, with both lower and upper limits, especially in the carbon, as the information at hand seemed to indicate was necessary to secure the proper material. But upper and lower limits of carbon involve the idea of a range. How much shall the upper limit be above the lower limit? Obviously, if the range was too narrow, the steel maker would find it difficult, if not impossible, to make the metal. On the other hand, if the range was too wide, it would go far toward defeating the end to be accomplished by the introduction of upper and lower limits. In view of this dilemma it was with some misgivings that specifications embodying these features were prepared and issued. The limits finally decided on were from 0.15 to 0.25 per cent. of carbon, or a range of 10 points, for soft steels, such as fire box; from 0.35 per cent. to 0.50 per cent., or a range of 15 points, for medium steels, such as are used in axles and crank pins, and from 0.90 per cent. to 1.10 per cent., or a range of 20 points, for hard steels, such as are employed in making springs. It is gratifying to be able to state that the limits have not proved too narrow. With very few exceptions, the steel makers have cheerfully and successfully worked within these limits. Is it too much to say that 20 years ago this would have been thought impossible? How many steel makers 20 or 25 years ago felt sure enough of their furnaces and their methods so that they would be willing to take orders and guarantee successful outputs on such limits as these? It, of course, is not claimed or even thought that this decided step forward in steel metallurgy is wholly due to specification, but is it too much to claim that the results now possible are, in part at least, due to the stimulus put upon the producer by the demands or desires of the consumer as embodied in specifications?

#### The Development of Specifications.

There is another phase of this stimulating influence of specifications on commercial products that will perhaps bear a word: In our experience, the first draft of a specification for any commercial product not heretofore bought on specifications is apt to contain not a few uncertainties. The consumer has been taking what the manufacturer gave him, without special study of its behavior in service, and the producer has been sending what the consumer would take, contenting himself in his study of his product usually to such problems as affected his successful output. Neither the producer nor the consumer rightly understand the material, the consumer because he has not yet carefully questioned the service as to what are its demands in the matter, and the producer because he knows his product, principally at least, only from the standpoint of a maker, and the consumer has not yet told him his side of the story. Accordingly, a first draft specification, as already stated, is usually founded on more or less incomplete knowledge, and will be fortunate if it runs eight months or a year without revision. But when a material arrives at the dignity of being bought on specifications, and every shipment is examined, much more attention is paid to its behavior in the service, and indeed every characteristic of it is studied. This study not infrequently leads to the ideas that modifications in the product are not only desirable but oftentimes essential if the usefulness and adaptability of the material in the place where it is being used are to be maintained. Moreover, the growth in size of almost everything connected with railroads is not only demanding continually new designs to meet the increased strains, but also, in view of the limitations of space, constant changes in the nature of the materials employed in construction are likewise essential if unwieldy, not to say impossible, designs are to be avoided. A few illustrations will perhaps make these points clear.

The mass of the first steel used in fire boxes contained from 0.10 to 0.13 per cent. of carbon. But a few years of service developed the fact that such soft lead like steel was badly abraded by the coal, and failed to satisfactorily hold the thread on the stay bolts. Hence in the speci-

cations at present in force a harder metal, whose carbon has already been given, was asked for. This change introduced no serious difficulties in manufacture, and very large quantities of the harder product have been furnished, and more successfully used, for some years now.

The first steel passenger car axles contained from 0.22 per cent. to 0.28 per cent. of carbon. But in the course of a year or two a number of these soft axles broke in detail, and a study of the case led to a demand for a stiffer steel for this purpose. Accordingly, when the present chemical specification for axles was prepared the limits of the carbon were placed at from 0.35 per cent. to 0.50 per cent., as has already been stated. These proposed limits led to no small amount of discussion. At that time few, if any, axles had ever been made containing over 0.30 per cent. of carbon. It was feared that even though the proposed metal might be successfully made in the furnace it could not be successfully forged. One steel maker told us in plain language we were making a most serious mistake, and that we would rue it. Another opposed the proposed specification in every reasonable way possible, and only took an order under it with the utmost misgiving. It is gratifying to be able to state that this latter maker of axles has within two years stated that the present axle specification was in every sense a most satisfactory one, and hoped it would never be changed. So great was the uncertainty and doubt about the ability to successfully make axles in accordance with this specification that the first deliveries were actually billed at  $3\frac{1}{2}$  cents a pound. Within four months the price dropped to 1 $\frac{1}{2}$  cents. Furthermore, a couple of years ago indications began to manifest themselves that even the present axle specification required modification in such a way as to require a stiffer metal still. Accordingly a number of the steel works were visited and the matter talked over with the experts as to whether they would be willing to try to make axles with from 0.50 per cent. to 0.65 per cent. of carbon. No one was found willing, but within six months word was sent by one of the works that they would gladly try it. Under the stimulus of the request experiments had been made which promised a successful outcome, and although the question of stiffening the present axle has not yet been decided, there seems no good reason to fear that if higher carbon is decided on as the best solution of the problem there will be any difficulty in obtaining it. Ten years ago we would have hardly dared to hope for it.

#### Spring Steel Specifications.

One more illustration of the stimulating effect of the consumer on commercial products, and I have finished. It was for a long time customary to use only crucible steel in making springs, either helical, elliptic or semi-elliptic, and in these springs the carbon employed was usually from 0.65 to 0.75 per cent. The service of these springs was very unsatisfactory. The breakage was something appalling, such that at some of the important repair shops a carload of broken helical springs would accumulate in a few months. At that time the spring makers decided on both the kind of steel to use and the design. They were given the space that could be allowed for the spring, and the load it must carry, and they did the rest. In fairness it should be stated that the conditions were severe, and that apparently neither producer nor consumer understood the situation. Very few tests had ever been made, and apparently the strains in the metal had never been calculated. The matter was taken up with some vigor by the consumer's experts and an attempt made to get an understanding of the situation. It developed that when some of the helical springs then in use were brought down solid the strain in the outside row of fibers was over 110,000 pounds per square inch. What wonder that the springs broke. As a result of the study of the matter a specification was prepared covering both the design and the quality of steel to be used. In view of the small space available, and with the tendency toward increasing loads already mentioned, it was felt that every advantage must be taken, and, accordingly, a round bar was decided on as being best able to resist the strains, instead of the flat or oval, which had previously been used; the maximum fiber stress was placed at 80,000 pounds per square inch, instead of the indefinite

110,000 pounds or more which had been characteristic of previous practice, and also a 1 per cent. carbon steel was specified instead of 0.70 per cent., as had previously been used. Still further, no mention was made of the process by which the steel should be made.

This proposed specification likewise met with some antagonism. It was urged, not without a good deal of show of reason, that crucible steel was the only fit material to use in making springs, and that so hard a steel as is given by 1 per cent. of carbon would be unreliable and probably cause more difficulty than had heretofore been experienced. It should perhaps be added for information that at this time the possibility of making a high carbon steel in the open hearth furnace had not been fully demonstrated, and that this proposed spring specification, leaving out the process by which the steel should be made, was a direct stimulus in the development of this method. The crucible steel people were, therefore, naturally a little anxious. It is undoubtedly well known that at the present time by far the largest portion of the steel used in springs is made in the open hearth furnace. Notwithstanding the antagonism, the specification as drawn was sent out, and although there were some difficulties at the start, and one spring maker at least refused to fill orders, it soon became evident that the specification was going to survive. The results in service were most gratifying. When 30,000 helical springs, according to specifications, had been put in service, a count was made of those which had broken, and only two were found. After three or four years, when there were perhaps 200,000 or 300,000 of these springs in service, a request was sent to one of the principal repair shops to send 20 broken springs to the laboratory in order that the relation between phosphorus and broken springs might be studied. At the end of three months only 12 had been secured, and those were used as the basis of the investigation. The effect of the specification on the producer was equally satisfactory. Special and patented forms of bars absolutely disappeared; the open hearth steel makers soon learned how to make with perfect success a high carbon steel, and from being antagonistic the springs makers soon changed to the warmest friends of the specification and recommended it everywhere to other railroads. It is perhaps not too much to say that 95 per cent. of all the freight cars built in the United States within the last 20 years are fitted with helical springs closely patterned after or made in accordance with the specifications whose birth we have been trying to describe.

#### The Influence and Voice of the Consumer

In the manufacture of commercial products have come to stay, and it is simply the part of wisdom for all concerned to recognize the situation. Also since both the producer and consumer have each a direct interest in the product or thing made, the one in its production and sale and the other in its use, there is no real reason why each should not study the product in most minute detail. If the producer knows better than the consumer, as he undoubtedly does, the effect of composition and details of manufacture on the thing made, so also does the consumer, if he studies as he should the behavior of materials in service, know better than the producer knows or can know the relation between the composition, the physical properties or even minute characteristics of the thing made and its successful use. It is only by the combination of information from each of these two sources that perfectly successful commercial products can be obtained. Finally, if these views are accepted as correct, is it not evident that all energy spent in antagonizing each other is so much lost effort, and that the true policy is to work harmoniously together in our attempt to convert the crude materials of nature into a shape to be useful in the service of man?

**The Damascus Crucible Steel Casting Company.**—The plant and business of the Damascus Steel Company, New Brighton, Pa., has been purchased by Charles Capper, formerly superintendent of the Colonial Steel Company, Colonia, Pa. A new company have been organized, known as the Damascus Crucible Steel Casting Company, who will operate the plant in the manufacture of steel castings.



## A Proposed Test for Detecting Brittleness in Structural Steel.\*

BY J. P. SNOW.

It is felt by many users of structural steel that mill inspectors should give more attention than is now usual to the detection of brittleness in our bridge material. Brittleness may be due to improper heat treatment or to segregated carbon or phosphorus. Those defects may occur in material rolled from part of the slabs derived from a given ingot, while material rolled from the same melt or even from other slabs of the same ingot may be exceptionally good. If the ordinary tensile and bending tests of the heat from which the material in question is derived should be taken from those parts where objectionable segregation had not occurred and which had received proper heat treatment, the results would not expose the brittle features of the part supposed to be bad.

The desideratum is a practicable method of testing, which will furnish the inspector a means of detecting brittleness in any piece that comes from the rolls that he suspects may be objectionable. The object of this paper is to suggest a scheme which seems to me to answer this requirement.

Prime essentials of a test of this sort are simplicity and quickness of accomplishment. Mill men say, with reason, that they cannot hold stock until machine finished samples can be prepared and elaborate tests made. I am informed that much of the material now being used is many miles from the mill on its way to the fabrication shop before the testing machine work is done on the specimens that are supposed to determine whether the material is to be accepted or rejected.

Determining the temperature of the metal after or before the last pass through the rolls is neither efficient, precise nor conclusive. Delaying the piece before the last pass until the right temperature is reached refines only the outer skin of the material. It is not the function of buyers to tell the manufacturer how he shall produce his steel or at what temperature he shall roll it, but rather to ascertain if the product which he offers is suitable for their uses. This can be best accomplished by testing the finished product in a direct way.

### A Nicked Bending Test.

The scheme herein proposed is in substance a nicked bending test on crop ends of plates and shapes as they are trimmed at the rolling mill for shipment.

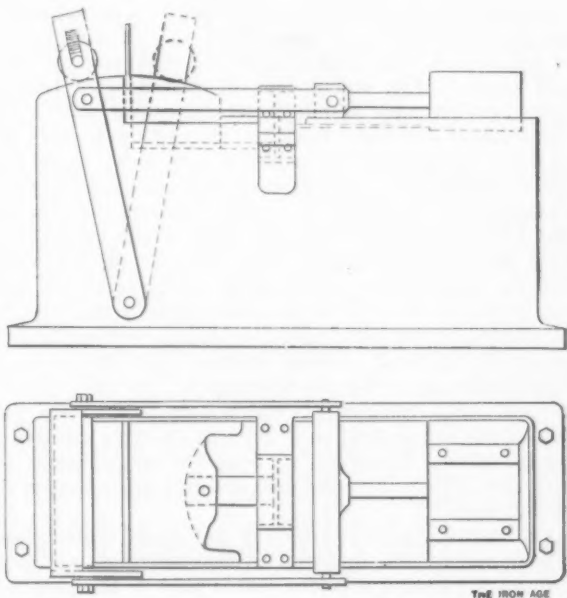
A nicked bend is proposed because the object is not so much to see if the specimen will bend without fracture as to open up the grain of the steel, to see whether it is fine and silky or coarse and crystalline.

It is proposed to take a generously wide piece of crop end so that the effect of the shear at the edges will not affect the result. It is deemed unfair to the manufacturer to depend upon narrow sheared specimens for this scheme of bending, because the injurious effect of the shear should not be assessed against the quality of the steel. Punched specimens are ruled out for the same reason. If narrow specimens with milled edges or punched specimens with reamed holes are used the vital element of quickness of accomplishment is lost; for while the specimens are awaiting their turn at the finishing machine the plate or shape from which they are cut is loaded for shipment or covered up in a pile of other stock. The scheme proposed will tell its story, if desired, before the rolling heat has left the piece. It can be executed and a decision reached almost as quickly as the surface inspection of a plate can be made.

In detail the scheme is to shear from the crop end a piece, say, 12 inches wide and nick it about 3 inches from one edge, preferably across the direction of the rolling, with a tool made for that particular thickness; clamp it in a hydraulic vise and bend the free end over by power. The accompanying sketch shows in outline a possible bending vise. Both the vise and bending roller are to be actuated by hydraulic power, which is always available in a rolling mill.

The nick is proposed to be made with a tool like a blacksmith's flatter, having a raised bead on its face.

Nicked bending tests by impact have been recommended in the past by many investigators. In 1892 Le Chatelier advocated such tests before the French Committee on Methods of Testing, and since that time work on these lines has been done by Barba, Considere, Le Blant, Aucher, Fremont, Osmond and Charpy in Europe and by S. Bent Russell and others in this country. All of these experimenters sought to determine the resilience of the material by impact tests, thinking to replace the ordinary tensile tests by these determinations. But as shown in Johnson's "Materials of Construction," impact testing is surrounded by so many uncertainties that it has never been found commercially practicable for structural materials. Evidently the constant effort has been to make the test prove too much. In the scheme herein advocated the object is not a complete physical test of the material, but simply an examination of the grain, as shown in the



PLAN AND ELEVATION OF THE PROPOSED BENDING VISE.

fracture, to ascertain if the material is brittle from any cause.

To insure a fracture in ductile material the deformation must be localized by a nick. The form of the nick, its depth and shape, must be determined by experiment, but for a beginning it is suggested that a depth of one-eighth the specimen be tried; the bead with which the nick is made to have the form of the Whitworth screw thread. Investigation may show that a single size of nick may be used for different thicknesses, but it is probable that each thickness should have its particular size. The nicking die may be struck by hand hammers or a light, quick acting steam hammer may be provided for the purpose.

### Method of Producing the Deformation.

As to the method of producing the deformation, it is possible that the distinctive difference between material that is good enough to be accepted and that which ought to be rejected cannot be brought out by making the bend with a press. It may be necessary to use impact, as was done by Fremont in a series of experiments described by him at the Budapest meeting of the European Railway Congress. These experiments show that a ductile steel may be broken short off by a blow of sufficient velocity. We know that ordinary structural steel when nicked and bent will invariably break unless it is exceptionally ductile and in very narrow specimens; hence, it seems that a press bend on a wide specimen will certainly produce a break and show up the grain. A press bend, if effective is preferable to a blow on account of its more certain action, and because it does not need adjustment for differ-

\* Paper read before the American Society for Testing Materials, Atlantic City, N. J., June 16, 17, 18, 1904.

ent thicknesses, as would be needed if the bending was done by a blow.

It is believed that a test of this kind will expose coarse grain in steel, due to improper heat treatment, segregation, bad chemistry or any defect that tends to brittleness. The engineer may, under present specifications, demand certain chemical and physical qualities when buying steel. He may not be justified in prescribing the exact ratios of the many "ites" or the precise "eutectic values" of the various compounds that enter into the material which the manufacturer gives him for steel, but he may reasonably demand simple tests like that advocated here to satisfy himself that the material is free from brittleness.

#### Advantages of Bending Tests.

In the past, when puddled iron was the usual structural material, engineers depended largely upon bending tests to ascertain the quality of the output of the mills. One member, C. C. Schneider, has told me that he cared little for the tensile strength, elongation and other physical features of wrought iron as determined by the testing machine, but that he set great value on cold bending tests of scrap ends. Sir Benjamin Baker, when engaged upon the Forth bridge, stated that he placed more reliance upon bending tests of mild steel than upon testing machine determinations. With the steel of the present day we must test for ultimate strength to secure a grade that can safely undergo the ordinary shop manipulations and examine the chemistry to secure uniform composition. But have we not too much lost sight of the valuable old time feature of bending? The ordinary plain bending will not always show us the grain of the steel. In fact, the width of the specimen and the radius of the bend are so selected in our usual specification that ordinarily good material will bend without fracture. Its ability to do this is the gauge for its acceptance. To this end the sheared edges are planed, which defeats the very purpose of the end desired on account of the time involved in the operation. Moreover, we bend but one specimen for each melt, which assuredly does not attempt to control the rolling heat.

It is true that the proposed test may involve closer attendance of the inspector at the mill than our usual commercial testing requires, and it may be impossible to define the lines by which an inspector shall be governed in rejecting material as sharply as can be done under our present system, but the inspector's attendance can be arranged for, and the results reached by Fremont give us a clue to what may prove to be a proper criterion for acceptance or rejection.

Referring again to Fremont's paper: It will be noted that when a specimen of nonductile material is bent a hardened ellipse tends to form on the compression side, which acts as a heel around which the fibers on the tension side have to stretch. If the specimen is nicked, this stretch is localized and confined to the fibers at the bottom of the nick and breaking is sure to occur. If the material is somewhat ductile and the specimen narrow, the compressed metal flows outward. This flowing out assists compression and tends to decrease the stretch required on the tension side by removing the heel further from the tension face, and hence helps toward a gradual break, instead of a short one. This consideration explains the well-known fact that wide specimens will not bend so successfully as narrow ones.

If in the proposed nicked bend the specimen should break around Fremont's "ellipse of enlargement," instead of square across, or if it did not break clear through, we could safely conclude that the material was not brittle. If the break was not square across and the fracture silky or but partly granular, we could presume that the heat treatment was good and segregation not excessive, but if the fracture showed crystalline facets or appeared dull and cokey it would be ground for rejection. After sufficient careful experimenting I am sure that workable limits can be fixed upon for the guidance of inspectors. It is possible that thick and thin material cannot be brought to follow the same law, but rules can be established for varying thicknesses. Material that is known to be good and that which is known to be bad, both from overheat-

ing and segregation, can be experimented upon and safe extremes established.

Metallurgical literature is filled at present with complaints of poor structure in rails, and to some extent in other steels. The complaint is not quite so common in regard to structural steel, for the reason, probably, that it is usually in thin sections which cool to a lower temperature than thick ones while passing the rolls. It is the case, however, that rolled beams have sometimes proved so brittle and untrustworthy that some engineers dislike to use them in railroad bridges. It is likely that the principal reason for this condition is too high heat during rolling, due to their heavy section. If the crop ends of such beams are sheared up so that a section of the web or flange can be nicked and bent in the proposed machine the coarse structure, if it exists, will surely be exposed, and the beam saved from discrediting its species when put into service.

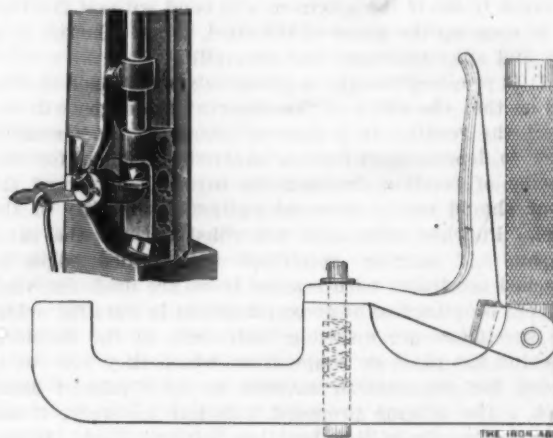
A similar test on crop ends of rails could be made while the rails were passing the straightening press, and many of those having coarse structure at center of head, open grain, lamination, pipes, sulphur flaws or other defects that one drop test in five heats does not detect would be saved from going into the track and causing trouble for both user and manufacturer.

The above scheme of testing is submitted for consideration by our members. It is intended to supplement the usual tests for physical qualities, and is suggested as a means of satisfying buyers of steel that their material is sound and free from brittleness. It is cheap in installation and operation, and requires the inspector's continuous attendance at the shearing end of the rolling mill, where he belongs. If properly executed it should tend to allay the agitation that is now going on among users of rails and structural steel in regard to heat treatment, open grain and other rolling mill defects. If the scheme is objectionable to manufacturers, it is respectfully offered for their free criticisms.

NOTE.—A translation of the paper by Fremont, referred to by Mr. Snow, has been published by Prof. C. L. Crandall, Cornell University.

#### The Billings & Spencer Safety Device.

The Billings & Spencer Company of Hartford, Conn., have added a safety device to their power hammer in the form of a switch handle plunger lifter which maintains the friction bar lever in the desired position without danger of it shifting from the jar of the machine, which,



THE BILLINGS & SPENCER SAFETY DEVICE.

for instance, might change the mechanism from a trip hammer to a long stroke, or *vice versa*, without warning to the operator. The shifting device, as shown in the illustrations, lifts a plunger from out a hole in the friction bar lever stud. By lifting the plunger from the hole the friction bar lever can be instantly thrown into or out of connection with the friction bar. Once the plunger is in either position for operation—that is, in either hole, no jar or vibration can change the position of the friction bar lever.



## New Publications.

**Canada's Resources and Possibilities.** By J. Stephen Jeans. Published by the British Iron Trade Association, London.

Last year there was a Congress of Chambers of Commerce of the British Empire at Montreal. One of the delegates was J. S. Jeans, well known to iron manufacturers on both sides of the Atlantic. As secretary of the British Iron Trade Association he represented that body. The meetings themselves did not accomplish much directly, but the delegates traveled over 11,000 miles between the two oceans, as guests of the Canadians, and thus were afforded exceptional facilities for studying the resources of the country and of observing the methods used to develop them and the spirit of those who apply themselves to that labor. Mr. Jeans, of course, gave particular attention to the iron and cognate industries, and, having traversed a good deal of the same ground before, was in a better position to do justice than is usual with the traveler whose judgment is largely based on observations made from the window of a Pullman car.

Mr. Jeans in his preface enumerates as follows the reasons for the special interest which the Dominion has for the iron trade of the mother country:

1. Because it is already the greatest market among the possessions of the British Crown, after the mother country herself.

2. Because it has offered to the mother country greater facilities and consideration than have been offered by any other colony or British possession.

3. Because the future increase of population, and consequently of iron and steel consumption, in the Dominion is likely to greatly exceed that of any other British possession.

4. Because Canada has herself enormous resources in raw materials of the iron industry, and is likely in the near future to enter on a large scale into the competition of iron making countries for the supply of the world's markets.

5. Because it is the attitude and the conditions of the Dominion that have primarily raised the pending controversy as to the fiscal policy of Great Britain in relation to her colonies.

A large part of Mr. Jeans' book is naturally devoted to descriptive matter relating to Canada and her people in general, and to the mineral resources and the iron manufacturing plants in particular. He does, however, go fully also into the economic policy of the country and deals with the tariff. He makes the point that higher duties might work to the advantage of the British iron makers, because the preference of 33 1-3 per cent. accorded to British makers would be a substantial help against the United States. Mr. Jeans, however, holds that the Canadian bounty system hits the iron trade of the mother country harder than it does any other interest. He continues: "The United States would appear on the first blush to be equally affected by it, but that is in appearance only. The mother country is not, like the United States, able to dump its produce on Canadian markets without adequate profits; unless the trade yields a profit it will not be done. This distinction is, of course, due to the fact that the United States are protected in their home markets, both by their general tariff system and also, more or less, by their organization on lines that enable prices to be artificially maintained. But that is not all. The United States boundaries march with those of the Dominion for over 3000 miles, and throughout this territory Great Britain has clearly but a small chance of successful competition against American producers, while in the maritime provinces, where she has a better chance, the bounties have stimulated the artificial development of indigenous industries that are now taking possession of the markets."

Mr. Jeans seems to sympathize with the Canadians in their feeling that British capital has stood more or less aloof, "greatly to the chagrin and disappointment of the Canadians, who are both annoyed at the fact that the Americans are getting a firm grip on the best investments that are available, to the loss of British

investors, and resentful of the neglect of the opportunities afforded by their country which British capitalists have shown."

Mr. Jeans touches upon the water powers of the Dominion, and upon the remuneration and hours of labor. He takes up shipping and shipbuilding and other industries casually, and winds up finally with chapters on Canadian commerce with the mother country and with the United States.

## St. Louis World's Fair Notes.

The Big Four turn table, which occupies a place in the center of the Transportation Building, in point of weight is one of the largest exhibits at the Exposition, the total weight of the foundation being 456,000 pounds. It is a so-called live exhibit, the turn table being arranged to rotate by power, while the locomotive which it carries is so supported as to allow its driving wheels to revolve. The turn table is 70 feet long and makes one revolution every 2½ minutes. The engine proper weighs 186,000 pounds, and is an example of the type now in use on the Cleveland, Cincinnati, Chicago & St. Louis Railroad. Its driving wheels make 54 revolutions per minute, which is equivalent to a speed of nearly 14 miles an hour.

A photo-engraving plant, for the manufacture of zinc etchings and half-tone plates, has been installed in the Graphic Arts Section of the Palace of Liberal Arts, and is in operation, making printing plates by both of these processes. The exhibit is a joint display of a St. Louis engraver and several manufacturers of the machinery used in the art.

The air ship competition, due to delay in the preparation of the gas generating apparatus and aerodrome, will not take place until early in July. The following entries have been received by Willard A. Smith, chief of the Department of Transportation: Edward Hutchinson, Austin Station, Chicago; Charles Stivin, 1443 Third avenue, New York; S. M. Williams, San Francisco, Cal.; Emery Curtis and George Davis of Gillespie, N. Y. Santos Dumont with his new air ship No. 7 will sail for this country on June 11. In all, 80 contestants have applied for admission to the meet. An entry fee of \$250 is required of each contestant. Those named have paid the required fee.

A model of a native worked plumbago graphite mine has been placed in position in the Ceylon space in the Mines and Metallurgy Building, surrounded by numerous samples of the various grades of this important mineral. Ceylon plumbago is world famous for its pure, flaky character. It is at present the island's only mineral of commercial importance, and it is also the one Ceylon article of which the United States purchases more than any other country. Great Britain, Germany and Belgium come next in order. Of the 525,000 hundred weights annually produced, of the value of \$2,000,000, about one-third is used in the manufacture of crucibles, one-third for stove polish (black lead) and the remainder for lubricating purposes, electroplating, black paint and lead pencils. The model is nearly 4 feet high, and one-half of it opens on a hinge to show the galleries and other interior features of the mine. It was made by a Government surveyor in Ceylon, and has been installed by R. Hayshe Elliot, assistant commissioner.

The visiting members of the Institution of Mechanical Engineers of Great Britain were the guests of New England members of the American Society of Mechanical Engineers, June 20 and 21. The first day the party went to Manchester, Lawrence and Lowell and visited several of the great cotton mills. The second day they visited the Massachusetts Institute of Technology, under the guidance of Professors Miller, Lanza and Schwab, most of the time being devoted to the heavy machine tools and testing machines of the mechanical laboratory. Afterward the party went to the Public Library, where they chanced to meet the members of the Honorary Board of Filipino Commissioners to the Louisiana Purchase Exposition, who had arrived in Boston after their visits to Bridgeport, Conn., and Fall River, Mass. The incident was a mutually pleasant one. In the afternoon the visiting engineers were taken for a sail down Boston Harbor

on a revenue cutter. After luncheon at the Point Shirley Club the voyage was resumed to Quincy, where the works of the Fore River Ship & Engine Company were inspected. The British engineers sail for home this week.

### No Settlement of Wage Scales.

After a conference at Cambridge Springs, Pa., lasting for eight days, between committees of the Amalgamated Association and the Republic Iron & Steel Company, no settlement of the puddling and bar iron scales for the year commencing July 1, 1904, was reached. The Amalgamated Association presented practically the same scale for boiling and heating that is now in force, with the exception that a number of new footnotes were added. The scale as presented is based on \$5 per ton for boiling on a 1-cent card. When the price of bar iron averages 1.3 cents puddling advances 25 cents a ton, and for each advance of 0.10 cent in the bar iron card puddling advances 25 cents a ton and the wages of finishers 2 per cent., this ratio being maintained until a 2-cent card is reached.

The committee representing the Republic Iron & Steel Company, which consisted of James H. Nutt, Labor Commissioner; G. Watson French and several others, objected to the scale presented by the Amalgamated Association, contending that, in view of the rapid decline in prices of iron bars and other products, a lower wage scale for the coming year was absolutely imperative. They presented a scale based on \$4.50 a ton for boiling on a 1-cent card. Radical reductions were asked on other scales, in the forge as well as in the finishing departments. Both sides argued their cases exhaustively for several days, and finally an adjournment was had on June 15, without a settlement being reached.

This does not mean that there will be any cessation of work in the mills of the Republic Iron & Steel Company and other companies that sign the Amalgamated scale, for the reason that an understanding exists between the Amalgamated Association and the manufacturers by which, in the event of failure to reach a settlement in the wage scale, the mills are to be operated right along until the scale has been arranged. It is probable that another conference will be held between the bar iron manufacturers and the Amalgamated Association next week, but in the event of no settlement of the scale being reached before June 30 a board of conciliation will be appointed. This will consist of three persons, one appointed by the Amalgamated Association, one by the Republic Iron & Steel Company, and these two will appoint a third. This, however, will be a last resort, and would only be done in the event of it being seen that a settlement of the scale could not otherwise be reached. While the decisions of the conciliation board would not be binding, yet they would have great weight and would probably be adopted by both sides. However, another conference between the Amalgamated Association and the manufacturers is almost certain to be held before June 30.

#### The Hoop Scale.

On Friday morning, in Pittsburgh, the committee of the hoop scale from the Amalgamated Association met the officials of the American Steel Hoop Company, which is controlled by the Carnegie Steel Company, and were in conference all that day and part of Saturday. As in the case of the puddling and finishing scales, the hoop mills also asked for a reduction averaging about 10 per cent. of the present scale. The matter was argued exhaustively by both sides, but no settlement was reached. It is probable that another conference will be held at an early date, as the Amalgamated Association committee desired to have some time to consider the propositions submitted by the manufacturers. Should it happen that no settlement of the hoop scale is reached before June 30 it will not interfere with operations of the hoop mills, as they will continue to run right along. The principal concerns that sign the hoop scale are the Carnegie Steel Company, who sign for the American Steel Hoop Company; the Sharon Steel Hoop Company, at Sharon, Pa., and the Pittsburgh Steel Company, with large hoop mills at Glassport, Pa. There are also a few smaller companies who sign the scale.

#### The Sheet and Tin Plate Scales.

Arrangements had been made for a conference on the sheet and tin plate scales between committees of the Amalgamated Association, the American Sheet & Tin Plate Company and the independent sheet and tin plate mills, which convened in the offices of the American Sheet & Tin Plate Company in the Frick Building on Tuesday morning. It will be recalled that in the early part of the year the Amalgamated Association granted an average reduction of 18 per cent. in wages in sheet and tin plate mills operated by the American Sheet & Tin Plate Company and by independent manufacturers as well. The sheet and tin plate mills have been working under this reduction of 18 per cent. ever since, and will continue to work under it until July 1. The scale presented by the Amalgamated Association for the sheet and tin plate mills for the year commencing July 1 calls for a reduction of only 10 per cent., and for this reason it is not improbable there will be considerable difficulty in arriving at a settlement of the sheet and tin plate scales that will be satisfactory to both sides. The manufacturers are disposed to insist that they be granted a reduction of at least 18 per cent., while some of the mills think the reduction should be 20 per cent. In support of their position, they point out the fact that the price of tin plate is very low, while sheets are selling at the lowest prices they have reached for several years. It is intimated that some two or three prominent sheet and tin plate mills that have signed the Amalgamated scale in the past will not be represented at the conference, but have decided to operate their mills nonunion after July 1.

**The Sheet and Tin Plate Conference.**—PITTSBURGH, Pa., June 22.—The second day's conference between the Wage Committee of the Amalgamated Association from the sheet and tin plate mills and officials of the American Sheet & Tin Plate Company opened in the Carnegie Building, Pittsburgh, this morning. The American Sheet & Tin Plate Company are represented by C. W. Bray, first vice-president; B. Goldsmith, J. R. Phillips and George Greer, the latter being district managers. Contrary to reports, the independent sheet and tin plate mills are not represented at the conference and have not been asked to attend. The scales governing the union sheet and tin plate mills of the American Sheet & Tin Plate Company will first be arranged, and then the same scale will be offered to the independent mills. In case no settlement is reached prior to July 1 the union sheet and tin plate mills will continue to operate under the present wages until a scale is adopted. This will prevent any strike among the mills provided the manufacturers desire to run after July 1. There are well defined reports that the American Sheet & Tin Plate Company will insist upon the present scale of wages, which is eight points lower than the scale offered by the Amalgamated Association, and will not agree to any compromise. The demand for sheets is dull at the present time, and the company could fill their orders very nicely from their nonunion sheet mills, which outnumber the union mills two to one or more. Some of the leading tin plate plants of the American Sheet & Tin Plate Company are union mills, but at the same time they have a large number of nonunion mills, and for this reason the company are well equipped to stand out for their demands, especially as regards the sheet scales. It is believed that the Amalgamated Association will do all in its power to effect a speedy settlement of the sheet and tin plate scales. The organization is in no condition to stand a strike. It has lost a number of important sheet and tin plate mills in the past year, and only recently declared off strikes at the plant of the McKeesport Tin Plate Company and at the Continental works of the National Tube Company. It is not believed a settlement of the sheet and tin plate scales will be reached at the present conference.

Herman Forst, purchasing agent of the Hamilton, Ont., branch of the International Harvester Company, will sail shortly for the Philippine Islands, where he will be stationed for some two years, in order to purchase Manila fiber supplies for his company.



### Cheaper Alcohol Desired for Industrial Purposes.

WASHINGTON, D. C., June 21, 1904.—Manufacturers of hardware and metal goods have begun to take an active part in the campaign now on foot to induce Congress to pass the so-called Boutell bills in the interest of cheaper alcohol for industrial purposes. One of these bills provides for the reduction of the present tax on pure grain spirits from \$1.10 to 70 cents per gallon, while the other permits the withdrawal from distillery warehouse, free of tax, of grain spirits that have been rendered nonpotable by mixing with them a small quantity of some denaturizing agent like wood alcohol, &c. The bills, which are now before the Ways and Means Committee, are being strongly urged by manufacturers and users of automobiles, small power boats, gasoline engines, &c., who would be glad to substitute methylated alcohol for gasoline, naphtha, &c., but for the present prohibitory price due to the high internal revenue tax, exceeding 1000 per cent. on its first cost.

#### Views of Manufacturers.

The hardware and metal goods manufacturers have recently joined in this movement by reason of the very great increase in the price of the principal ingredient of metal lacquers—namely, fusel oil—which within a comparatively short period has quadrupled. In a memorial which a number of prominent manufacturers have forwarded to the Ways and Means Committee the present situation with reference to lacquers and the necessity for the abolition of the tax on methylated spirits are set forth as follows:

Lacquer is used as a protective covering on all polished metal goods, brass beds, metal furniture, locks, clocks, hardware of all kinds, &c., and on trunks, valises, and on metal and leather goods of similar character, and on the large variety of articles known as lacquered ware. The only satisfactory commercial solvents for the manufacture of lacquers are ethyl alcohol, sulphuric ether, which is made from ethyl alcohol, and fusel oil, which is a by-product of ethyl alcohol distillation. The tax of \$2.07 per gallon practically prohibits the use of ethyl alcohol and sulphuric ether in this country, and in consequence nearly all American lacquers are made with fusel oil. This has created an abnormal demand for the latter material, under which the price has steadily advanced from less than 50 cents a gallon, a few years ago, to nearly \$2 a gallon at the present time. Unless there is a large increase in the production of alcohol, thereby increasing this by-product, the price will still further increase, since the demand is increasing more rapidly than the supply.

With the tax removed from ethyl alcohol there would follow a very great increase in its production, and consequently an increased yield of fusel oil, which would tend to restore prices to their normal condition. An untaxed denaturalized alcohol could be used instead of fusel oil in the manufacture of many lacquers and enamels; this would still further reduce the cost of these materials.

We believe that the system of untaxed denaturalized alcohol provided for in this bill is entirely practicable, and that its adoption would be of great benefit to the manufacturing interests of the country by enabling them to produce cheaper and better goods, thus benefiting the entire consuming public. Its enactment would also develop and extend our export trade in many important lines through the lowering of the cost of production, thus placing our manufacturers on equal terms with their rivals in foreign countries in competing for the world's trade.

#### American Industries Handicapped.

The leading European countries long ago adopted the policy of free denaturalized alcohol for industrial purposes, and this policy has given many foreign industries an enormous advantage over American producers. This is particularly true in the case of Germany, where the manufacture of chemicals has reached enormous proportions, due quite as much to the ability of manufacturers to secure alcohol at the cost of production as to the extensive research work and finely equipped laboratories maintained by all leading establishments in this industry. Alcohol derived from potatoes and denaturalized so as to render it nonpotable may be bought in Germany for a few cents a gallon, and is largely used for lighting, heating, cooking and other domestic purposes, in addition to being consumed to the extent of many million gallons in the industrial arts. American manufacturers find themselves wholly unable to compete with their German rivals in neutral markets, even with the aid of foreign alcohol used with benefit of drawback, owing to the red tape now surrounding the drawback system, while German manufacturers of chemicals are able to invade American mar-

kets for the reason that the tariff laws, though levying high duties on products in which alcohol is present, do not provide protection for goods in the manufacture of which alcohol is used but is not present in the finished product.

Representative Boutell's bill reducing the tax on pure grain spirits from \$1.10 to 70 cents is designed for the double purpose of putting an end to illicit distilling and of reducing the cost of pure grain spirits to those industries which cannot employ methylated alcohol, including medicines, perfumeries, cosmetics, &c. The present tax on grain spirits is so high as to furnish a very large profit to the illicit distiller, and hence it is contended with apparent reason that a reduction in the tax would not result in any material decrease in revenue from this source. The granting of free alcohol for manufacturing purposes would not decrease the revenues, for the reason that very little pure grain spirits are now employed industrially and free methylated alcohol would simply take the place of large quantities of wood alcohol and other substitutes.

The Ways and Means Committee has recently given considerable attention to this subject, and the present Commissioner of Internal Revenue has drafted a bill at the request of Chairman Payne designed to provide free methylated spirits while effectually safeguarding the revenue. This measure has appeared to be unnecessarily complicated, but it is hoped that a satisfactory compromise can be reached at the coming session, when a very strong effort will be made to pass both the Boutell bills.

W. L. C.

### Central American Notes.

SAN JOSE, June 6, 1904.—The Government has decreed the fortification of Port Manzanillo, on the Pacific, and as soon as the iron and steel work on piers and breakwater are finished the new work will begin. It is expected that by this time the railway line will have been finished from Colima to that port, and that most of the material needed will come from the United States. There is still a vast amount of work to be done on the railroad line which is to connect Oajaca and San Marcos, in Guatemala. It may look very near on the map—but a few hundred miles—whereas, the whole route is one continuous chain of mountains and ravines, where it has always been difficult to maintain even a bridle or mule path. There is no doubt that there will be plenty of miles which with cost \$150,000 and even \$200,000 per mile. Luckily the enterprise is backed by sufficient capital, and, of course, once the line is built through not only will they have the agricultural riches of Guatemala to count on, with its coffee, cacao, sugar, cotton and fine timber, but the States of Oajaca, Guerrero and Chiapas will yield enormously from their copper, iron, silver and gold mines.

In this connection it is well to remember that the reconstruction of the Ocos Railway, on the Pacific coast, will form a link in the Pan-American Railway, and that the work on the Honduras Government road from Tegucigalpa to Arnabala, which is now being pushed, will help to make that republic much more accessible. Up to the present nothing but mule-power has been possible either for man or freight between the capital and the ports. Oxcarts with solid wooden wheels, which made about 10 miles a day, are still used considerably, and this is the only means of getting any piece of machinery weighing over 200 pounds into the mining regions of Rosario, San Juan, El Valle and so many other places near the Nicaraguan border.

Within a year the Government of Nicaragua expects to connect its Pacific Railway with the branch now building from Bluefields, on the Atlantic. This will need a connecting steamer line on the lakes, say for a distance of 100 miles. This line will get most of the new cotton shipments and at least half of the coffee in the country. Much of the mining machinery for La Libertad district will also come by this route. The American company on the Cocos River are bringing in considerable railway material, and the dredging of the harbor and river is going ahead. American laborers are protesting hereabouts at the low wages the natives work for.

C.

# The Iron Age

New York, Thursday, June 23, 1904.

|                         |   |   |   |   |   |   |                    |
|-------------------------|---|---|---|---|---|---|--------------------|
| DAVID WILLIAMS COMPANY, | - | - | - | - | - | - | PUBLISHERS.        |
| CHARLES KIRCHHOFF,      | - | - | - | - | - | - | EDITOR.            |
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## The World's Iron Consumption.

Statisticians have made various estimates of the per capita consumption of iron in different countries, but while they have reached some interesting conclusions they have generally distorted the situation by endeavoring to present it in a nutshell. The production per capita can be shown with accuracy; the consumption cannot be. The usual procedure of estimating imports and exports of iron and steel commodities, reduced to terms of pig iron, introduces, for some comparative purposes, a greater error than the misstatement it seeks to correct. True consumption is that use of an iron product which reduces its value. Using a piece of crucible steel to make a watch spring is not consumption in this sense; allowing the watch to go is. Using foundry pig iron or merchant bar to manufacture a harvesting machine is not consumption, but gathering a crop of grain is.

It is a well recognized fact that while the order of progression through the various ages, stone, bronze, &c., has been identical with all peoples, the time of passage from one age into another has been very different. Some tribes are still in the bronze age, and others have not emerged from the stone age. It is for the purpose of concluding where the various peoples of the earth stand in relation to their progression toward or through the iron age that statistical comparisons such as those referred to are valuable. It is manifestly unfair, however, to gauge the progress of a people simply by the number of tons of ultimate consumption. Such a comparison works to the disadvantage of a people who must pay high prices. Relief is not obtained by turning from tonnage to values. A country which consumed large quantities of imported watch springs or intricate machinery would thereby receive undue credit, while the country which fabricated these articles at the expense of much labor and skill would receive no credit at all for its achievements. For instance, J. S. Jeans estimates that about one-half in value of iron and steel products of Great Britain, not including some very finely wrought products containing steel, is exported, while the actual tonnage of exports, reduced to pig iron equivalent, is only about one-fourth the domestic production. Our own country, again, has, as a rule, exported comparatively little pig iron or heavy forms of iron and steel, but has been a heavy exporter of agricultural machinery, printing presses, electrical machinery, typewriters, &c. As an index of civilization, a country should certainly receive more credit for the consumption of a ton of printing presses or typewriters than for the consumption of a ton of sash weights or cast iron pipe.

As a statistical basis for study, therefore, it is deemed preferable to take actual production of pig iron, since that is something which can be presented with the utmost accuracy. In the first table below the production for both 1902 and 1903 is given, where possible, since there have been important progressions by several countries. The metric tons have all been reduced to English gross tons. The per capita production in the second table is, where possible, figured on the 1903 production. The populations

are, with the exception of that of the United States, taken from a recent presentation of the Government, the total in which agrees within 6,000,000 with a late German compilation. In the case of the United States the Treasury Department's estimate for July 1, 1903, is used.

### The World's Pig Iron Production.

|                            | 1902.       | 1903.       |
|----------------------------|-------------|-------------|
|                            | Gross tons. | Gross tons. |
| United States.....         | 17,821,307  | 18,009,252  |
| Germany and Luxemburg..... | 8,269,700   | 9,026,251   |
| United Kingdom.....        | 8,517,693   | 8,811,204   |
| France.....                | 2,389,000   | 2,782,986   |
| Russia.....                | 2,481,066   | *2,481,066  |
| Austria-Hungary.....       | 1,407,902   | *1,407,902  |
| Belgium.....               | 1,053,000   | 1,197,275   |
| Sweden.....                | 516,110     | 481,961     |
| Spain.....                 | 344,469     | *344,469    |
| Canada.....                | 319,557     | 265,418     |
| Italy.....                 | 30,156      | *30,156     |
| Japan.....                 | 24,108      | *24,108     |
| Other countries.....       | 150,000     | 200,000     |
| Totals.....                | 43,324,068  | 45,962,048  |

\* Latest return, 1902.

### Per Capita Production of Pig Iron.

|                      | Population.   | Per capita production. |
|----------------------|---------------|------------------------|
|                      |               | Pounds.                |
| United States.....   | 80,047,000    | 499                    |
| Germany.....         | 58,549,000    | 380                    |
| United Kingdom.....  | 41,961,000    | 470                    |
| France.....          | 38,962,000    | 160                    |
| Russia.....          | 141,000,000   | 39                     |
| Austria-Hungary..... | 45,405,000    | 89                     |
| Belgium.....         | 6,694,000     | 401                    |
| Sweden.....          | 5,199,000     | 208                    |
| Spain.....           | 18,618,000    | 41                     |
| Canada.....          | 5,457,000     | 109                    |
| Italy.....           | 32,475,000    | 2                      |
| Japan.....           | 45,862,000    | 1                      |
| The world.....       | 1,509,134,000 | 68                     |

The United States is the great iron consumer. With a production of 499 pounds per capita, it exports a less proportion of its product than does the United Kingdom with 470 pounds production, Belgium with 401 pounds or Germany with 380 pounds. A very liberal allowance for all exports would leave the United States as the consumer of 475 pounds per capita, while with allowance for such exports as they do not make to each other, the United Kingdom, Belgium and Germany would show an actual domestic consumption of only about 300 pounds per capita.

Even the United States has not reached the limit of iron and steel consumption. It has not wholly abandoned the use of wooden fences, telegraph poles and railroad ties, yet there are countries, not producers of iron, where these are inadmissible. It is not an impossibility that our consumption of iron, already seven times that of the world at large, should be doubled, while should the whole world reach the present standard in the United States the world's production of pig iron would have to be increased sevenfold.

An interesting comparison can be made by segregating those countries which produce more than 100 pounds per capita. This selection includes the United States, Germany, the United Kingdom, France, Belgium, Sweden and Canada. These countries have a population of 236,869,000 and produce 41,500,000 tons of pig iron, while they export to outside countries the equivalent of about 6,000,000 tons, consuming themselves, therefore, about 35,500,000 tons, which is equal to 336 pounds per capita. The remainder of the world, with 1,272,265,000 population, produces 4,500,000 tons, and imports the equivalent of 6,000,000 tons, showing a consumption of about 10,500,000 tons, which is but 18½ pounds per capita.

Obviously, then, while it may be that but a small part of the world has not entered the iron age from an archaeological standpoint, a very preponderating part of it has not entered it from the modern standpoint as exemplified in the seven countries enumerated above. It would



be straining a point to hold that the world at large must attain the rate of consumption shown in the favored countries. Their heavy consumption has been encouraged by the proximity of the productive operations. Still, a large measure of increase is bound to come, partly by the establishment of iron making in new districts, and partly by a heavier international trade. Iron ore is probably amply well distributed throughout the world for all consumptive purposes, the real obstacle being a rather poor distribution of fuel, and this may in some instances be overcome by electric smelting through the medium of water power, or, it is barely possible, by an even more direct use of solar energy.

Where local production fails there is bound to be a much greater call upon the favored districts. Japan and South Africa are merely instances of what can be expected sooner or later throughout the world in the way of demand for the great metal of civilization. Our rails, agricultural machinery, printing presses and typewriters are energetic advance agents over almost the whole globe, and their work will bear more and more fruit in the future. The historian of a century hence may, perhaps, find occasion to grow sarcastic at our present disposition to regard the world as being really in the iron age.

### The Progress of the Steam Turbine.

It is not to be expected that the supremacy of the steam turbine over the reciprocating engine will be conceded without a spirited resistance on the part of manufacturers of the latter, but it is a significant indication of a revolution in steam engineering when three of our largest builders of steam engines have already added to their lines types of this newer form of prime mover. Of no less moment is the fact that so august a body of the well informed as our American Society of Mechanical Engineers and the Institution of Mechanical Engineers of Great Britain, in their recent joint convention, gave an entire evening session to hearing and discussing four papers which were ostensibly nothing more nor less than expositions of as many types of the steam turbine. Nor did a number of the members, disinterested though they were, hesitate to express frankly their indorsement of the newer machine. Still there is bound to ensue a contest between the more conservative and the overenthusiastic.

The gist of the situation at the present time was aptly expressed by one of the speakers toward the close of the discussion referred to. He maintains that the decision of the better machine should be dependent not on the relative efficiency of the two types in terms of steam consumption, but rather on a basis of dollars and cents, which after all is the rational standard for comparison. He avers that the best reciprocating engines are more economical in their use of steam than the turbines so far developed. However, he also reminds us that, although the triple expansion type is acknowledged to be the more efficient, the simple engine is still in the field. From this standpoint there seems to be no disputing the advantage of the turbine, for it is cheaper in first cost, occupies less space per unit of power, requires less attendance and is subject to a smaller expense for repairs and maintenance.

Granting, then, that the turbine is here to stay, why not dispose in a similar manner of this other mooted question, what vacuum should be maintained on the exhaust? Quite naturally, the makers of the turbines desire a high vacuum, and if permitted to do so will specify it, knowing that the performance of their machines will then appear to best advantage. It remains a truth that

the expense of equipment and operation very rapidly increases the more nearly a perfect vacuum is attained, and doubtless at a moderately excellent vacuum the point is reached where its further improvement entails a greater cost than is warranted by the decreased water rate of the turbine.

*Dun's Review* alludes to the present dullness in trade as "an epidemic of ultra conservatism." This may perhaps be a suitable term to apply to the quiet condition of business, but it implies that conservatism has been pushed to such an extreme that it amounts to a disease. While this may be the case, yet it appears to be rather an extravagant assumption that business men generally are acting unwisely in exercising caution. They are apparently influenced, that journal states, by the theory that a season of depression must come every ten years. This, we believe, may be doubted as a potential factor. Every man manages his business according to the necessities of the situation. If he finds a reasonably fair demand for what he manufactures or sells he will feel warranted in purchasing sufficient supplies to meet that demand. He will certainly not be so unwise or short-sighted as to refrain from placing himself in a position to do business merely through fear that something adverse may happen. It is conceded that those who must anticipate the future and make preparations for a trade of unknown proportions will act conservatively when prices show a downward tendency, but that is simply ordinary prudence. They will not knowingly lay in stocks of materials on which they expect a shrinkage in value. This caution can hardly be regarded as ultra, because it is simply natural. If, as described by the *Review*, it is unnatural, it will then be forced beyond a proper point, and the recoil which will come when consumers or buyers generally begin to stock up would bring on another period of excessive activity. This is not the view taken of the present situation by manufacturing and commercial interests generally. It is regarded as a period of perfectly natural rest.

## CORRESPONDENCE.

### The Northwestern Iron Company Also Fifty Years Old.

To the Editor: I have just read with much interest, in your issue of June 9, a report of the celebration of the semicentennial of the Thomas Iron Company, and note you remark that this is the "only iron making company of their age who are conducting business under their original name, without change or reorganization in any way whatever." Now, I am not ambitious to be reminiscent or to take away a single laurel from the justly famed Thomas Iron Company, but I suppose that the truth of history should go before all, and that this may be so let me advise you that the Northwestern Iron Company, whose plant is located at Mayville, Wis., were chartered February 9, 1854, and have been engaged in the manufacture of pig iron continuously since that date. Indeed, the original furnace was constructed in 1848 and had been making iron for five years prior to the date of the incorporation of the company, who are still making iron at the old stand.

IRVING M. BEAN, President.

MILWAUKEE, WIS., June 14, 1904.

Bradlee & Co. of Philadelphia have secured from H. I. Crandall & Son Company of East Boston, Mass., a contract for a large marine railway chain, for a railway that the Messrs. Crandall are building on the Pacific Coast. The main chain is of 2½ inches, and, together with the backing chain, amounts to over 5000 feet. All the chain is to be subjected to a very high breaking and proof strain.

### National Metal Trades Association Notes.

CINCINNATI, OHIO, June 20, 1904.—The Cincinnati Metal Trades Association will hold its regular foremen's meeting at the association rooms Thursday evening. These meetings are instructive and profitable, and are now a recognized institution in a number of cities. The papers read and discussed deal with questions of shop practice and shop management. The results of these meetings have been to make men better foremen, better producers and better handlers of men.

In St. Louis over 200 applications for employment were received in the Labor Bureau office last week, while only a very few vacancies occurred. On June 13 150 men and boys employed in the wire department of the Leschen Rope Company demanded a 10 per cent. increase in wages and struck on its refusal. A recently formed union is the explanation of the strike, which was quickly broken, all places being filled in a few days.

Pittsburgh, Boston and Worcester report but little improvement in industrial conditions.

The boiler makers' strike in New York continues, although the shops of the New York Metal Trades Association are being gradually filled, and with a better class of boiler makers than the shops ever had. Picketing persists, and two boiler makers were assaulted on Thursday of last week. The members have decided that there shall be no retreat from their stand for the open shop, and that there shall be no further negotiations with the strikers. Some trouble has been experienced with foremen, who have been either union men or in active sympathy with the strikers.

In Baltimore John B. Adt, a member of the National Metal Trades Association, with the assistance of that organization, the Baltimore Metal Trades Association and the Anti-Boycott Association, on June 13 obtained an injunction against the machinists, brewery engineers, steam fitters' union, Baltimore Federation of Labor and others. The injunction prohibits them from carrying into effect a boycott against his business. The defendants are enjoined from interfering with or hindering John B. Adt in conducting his business by following delivery wagons on the streets for the purpose of finding where work is to be done, or from going to or sending any communications to customers for the purpose of inducing, persuading or compelling, by threats or intimidation, such customers to withhold work they might otherwise give him or compel him to stop work ordered from him; from publishing anything that would tend to discredit or injure his business or the business of any person for whom he may do work. This injunction is the first ever issued in Maryland for such purposes, and will no doubt mark an epoch in similar decisions.

Members of the National Metal Trades Association everywhere are quietly and effectively picking up good men and sending them into Chicago to the relief of their fellow members suffering from the strike. Men are being taken care of, and as fast as any trouble develops an injunction is taken out by the Chicago Employers' Association in behalf of the shop in trouble. Eight such injunctions have been granted up to date. Secretary Wuest continues in charge of affairs on the ground. He has organized foremen's meetings at frequent intervals, and as a result of the education received therein a number of foremen have realized that they could not serve the union and the employers, and have given up their union cards. Disaffected foremen have been replaced by the men furnished through the National Metal Trades Association. The quantity of work turned out by the new men is very much greater than turned out by the union men, on account of the decided restriction caused by the union. In one instance eight high priced boring mill hands have been replaced with one good mechanic, who sets up the work and starts the cuts, and eight handy men watch the tools run and stop the machines until the machine setter can give them attention. Not only is the aggregate wage less, but the production is considerably more under this system than it was formerly.

The Minneapolis Steel & Machinery Company, Minneapolis, Minn., manufacturers of boilers, Corliss engines,

elevator and conveying machinery, have opened an office in Room 1007, Bessemer Building, Pittsburgh, with R. F. DeForest, assistant purchasing agent, in charge.

### The Pacific Coast Trade Outlook.

SAN FRANCISCO, CAL., June 11, 1904.—Crop prospects have brightened a great deal in every respect. Recently the experts here gave 1,000,000 tons as the outside yield of wheat and barley for the year; now the figures are nearer 750,000 tons of wheat and 600,000 tons of barley. This would make a great difference in the purchasing power of the farming community all over the State, and, as prices are good, we may expect the general trade to be much superior to what it was a year ago.

Up to the present the hardware and metal trades have been comparatively dull compared with 1903. There were various good reasons for this, among them being storms and strikes in the transportation trade, all of which proved a setback to distribution, and consequently to purchase. It must also be admitted that the dullness of things in the Eastern States was reflected here to a greater or less extent, and it is usual to set down the year of a Presidential contest as one of poor trade.

But with the ripening of the cereal harvest now coming on, and the fact that the warm weather, which was expected to bring along north winds and damage, has not had these unpleasant accompaniments; but that, on the contrary, grain has thriven, the current of confidence is setting in the right direction, and the fall of 1904 will probably show the best trade that we have had in many years, that of 1903 not being an exception. The fruit crop, too, looks better as time goes on, and fruit is now being picked for shipment East and canning here.

The various other lines of business which tend to support the hardware and metal trades also show signs of improvement, particularly oil, lumber and mining. The development of new pipe lines by independent companies and of storage facilities by the Standard and other companies has led to a big demand for pipe and tankage. The shipment of redwood from the mills for the past seven or eight weeks has been greater than ever before, and this will call for additions and improvements to the mills already cutting lumber. Besides, there are new mills projected, among them two of the largest ever seen in the State, by Eastern people. The same is true of the sugar and white pine lumber trade, all the mills of which are now running to their full capacity and selling all they can make.

This is also a good year for mining, and many new mining properties will be developed, requiring new machinery and supplies of all descriptions. The building boom keeps up, showing no signs of abatement, and the demand for building hardware is increasing. The full effect of all this will not be felt until a few weeks later, but the work here specified is already laid out, capital is ready, and supplies will be wanted very soon.

Heavy shipments to Japan for the use of the Government still continue the order of the day. The "Siberia," which cleared to-day, took out a very heavy cargo, which shows that the moneys subscribed in New York for the Japanese loan are being distributed again among the industrial community of the East. The vessel referred to, one of the new ones, belongs to the Pacific Mail, and is one of the largest freighters in the world. This vessel had electrical supplies valued at \$7860, structural iron (141,693 pounds), \$35,000; steel rails (303½ tons), \$12,000; fish plates (727,546½ pounds), \$24,024; bed plate (5½ tons), \$2000; car bodies, \$8100; bar steel (743,304 pounds), \$6388; trucks, \$25,000; bicycles, \$9692; machinery, \$22,979; or a total of over \$130,000. The "Doric," June 1, had 752 tons of steel rails, valued at \$20,299; iron girders (48,400 pounds), \$4650; steel bars (113,254 pounds), \$11,325; structural iron valued at \$35,000; bicycles valued at \$11,245; machinery, \$46,406; a total of nearly \$130,000. Thus these two vessels had iron and steel manufactures of a value of \$260,000. The export demand for the Hawaiian Islands is increasing as the prospects of the sugar trade are improving. J. O. L.



## PERSONAL.

S. A. Wallace, formerly superintendent of the Alliance plant of the American Steel Foundries, Alliance, Ohio, has resigned.

John A. Topping, president of La Belle Iron Works, Steubenville, Ohio, has resigned to become president of the American Sheet & Tin Plate Company, succeeding W. T. Graham, who retires July 1 or August 1. The resignation of Mr. Topping as president of La Belle Iron Works has made necessary some changes among officials of that company, and Isaac M. Scott will be elected to the position of president and treasurer.

On Monday evening W. P. Snyder, president of the Clairton Steel Company; James B. Oliver of the Oliver Iron & Steel Company; G. G. Thorp, general superintendent of the Clairton Steel Company; Walter Fitch, mining engineer; W. A. Barrows, general manager of the Shenango Furnace Company, Sharpsville, Pa., and C. D. Dyer, general freight agent of the Crucible Steel Company of America, left Pittsburgh in the private car belonging to the Henry W. Oliver Estate and will make a tour of the ore regions. They will return by way of St. Louis and will spend several days at the Fair.

Otto G. Hoffman, for the past 14 years employed at the Whitman Barnes Mfg. Company, has taken a position as manager of the Canton Drop Forging & Mfg. Company, Canton, Ohio.

H. L. Kinsley, who has been with Manning, Maxwell & Moore for the last five and a half years, and was formerly with the Hopedale Screw Company, will represent Warner & Swasey Company of Cleveland, Ohio, in the East, commencing July 1.

William N. McKnight, for a number of years special agent and metallurgist for the Harbison-Walker Refractories Company, has recently resigned to accept the position of general manager of the Federal Refractories Company, whose plant for the manufacture of silica, magnesite and chrome brick is now building at Alexandria, Huntingdon County, Pa.

Geo. M. Bard, until recently president of the Emlyn Iron Works, Chicago, will sail shortly for an extended tour through Europe, which will include Copenhagen and St. Petersburg on the north and Rome on the south.

C. M. Schwab has returned from a brief trip to Europe.

Leonard Peckitt, Catasauqua, Pa., has been elected president of the Sheffield Coal & Iron Company of Sheffield, Ala. Mr. Peckitt continues his connection as president with the Empire Iron & Steel Company.

## Labor Notes.

The Chicago Brass Manufacturers' Association have scored a complete victory in the strike which was called January 1 by the chandelier makers and ultimately extended to all crafts represented in the shops of the members of the association. The Brass Molders' Union, which for years had dominated the labor situation in all brass working crafts, joined hands with the International Metal Polishers, Buffers, Platers and Brass Workers' Union and took an active part in the strike. Last week Wm. M. Webster, commissioner for the Brass Manufacturers' Association, announced that the closed shop in the brass crafts is a matter of history; that all the members of his association are working on the open shop basis and that the unions have either been disrupted altogether or the majority of the members have deserted them to go back to work in their old positions as individuals.

The Chicago Federation of Labor at their meeting Sunday, June 19, completed the revision of their constitution and by-laws. The most important new clause inserted in the constitution reads as follows: "If one agreement is violated by an employer, all other agreements between that employer and other unions are hereby abrogated." This is taken to mean compulsory sympathetic strikes, and a large number of unions in the federation will withdraw unless the clause is repealed.

The Holyoke Machine Company, Holyoke, Mass., have petitioned the Massachusetts Superior Court asking for an injunction restraining Local 115 of Holyoke, Iron Molders' Union of North America, from picketing the shops of the company, and from acts of conspiracy, intimidation and violence. Twenty-nine members of the union are made parties to the bill of complaint.

In the District Court, Topeka, Kan., June 17, Judge Hazen dissolved the temporary injunction against the striking Santa Fé Railway machinists secured by the company on May 9. The court held that there was no cause for a further continuance of the injunction, as the strikers appeared orderly.

## Iron and Industrial Stocks.

Crop prospects have dominated the stock market during the past week, having more than counterbalanced the unsatisfactory commercial advices from trading centers. Favorable reports from the great grain producing sections of the country have promoted the growth of a much better feeling among those who are interested in stocks, and values have steadily hardened, although transactions have not been large. The feature which is the subject of most favorable comment is the persistent purchase of bonds, which indicates an improved feeling of confidence among conservative investors. The United States Steel 5 per cent. sinking fund bonds advanced during the week ending Tuesday from 74% to 75%. The preferred stock in the same period advanced from 54% to 55%. Last transactions on active stocks up to 1.30 p. m. Wednesday were as follows: Car & Foundry common 17%, preferred 71; Locomotive common 19%, preferred 83%; Colorado Fuel, 29%; Pressed Steel common 27, preferred 70; Railway Spring common 17, preferred 73; Republic common 6%, preferred 41%; Sloss-Sheffield common 36, preferred 83; Tennessee Coal, 35%; United States Steel common 9%, preferred 55%, new 5 per cent. bonds 75%.

The committee having charge of the readjustment of the capitalization of the United States Realty & Construction Company announce that more than half of the entire stock of the company has been deposited under the terms of the circular of May 25, to be exchanged for the bonds and other securities of the United States Realty & Improvement Company. The latter company have been incorporated under the laws of New Jersey, with an authorized capital of \$30,000,000. The plans for the reorganization of the company were published a few weeks since in these columns. The approval by so large a part of the stock of the company of the reorganization scheme is taken to insure its success.

The Cambria Steel Company last week paid off \$315,000 of the \$1,275,000 outstanding amount of the total issue of \$3,500,000 5 per cent. notes created December 15, 1900, before the control of the property was acquired by the Pennsylvania Railroad. This leaves a balance of \$960,000 outstanding, of which \$350,000 will be paid next December, \$45,000 in 1905 and \$565,000 in 1906.

**Dividends.**—The Pittsburgh Plate Glass Company, Pittsburgh, have declared a quarterly dividend of 2½ per cent. on the common stock, payable July 1.

The Westinghouse Machine Company, Pittsburgh, have declared the regular quarterly dividend of 2½ per cent.

Empire Steel & Iron Company have declared a quarterly dividend of 1½ per cent. on the preferred stock, payable July 1.

American Iron & Steel Mfg. Company have declared a quarterly dividend of 1¼ per cent. on the preferred stock, payable July 1.

Tennessee Coal, Iron & Railroad Company have declared the regular quarterly dividend of 2 per cent. on the preferred stock, payable August 1.

American Smelting & Refining Company have declared a quarterly dividend of 1¾ per cent. on the preferred stock, payable July 5, and a dividend of 1¼ per cent. on the common stock, payable July 26.

International Steam Pump Company have declared a quarterly dividend of 1½ per cent. on the preferred stock, payable August 1, and a common stock dividend of 1 per cent., payable July 1.

American Shipbuilding Company have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable July 15.

Andover furnace, at Phillipsburg, N. J., owned by Joseph Wharton, has resumed production. It was banked for a considerable period.

Horatio Keyes, who founded the Standard Wheel Works at Terre Haute, Ind., died recently at his home, in that city, aged 74 years.

## MANUFACTURING.

### Iron and Steel.

The Lorain Steel Company, Philadelphia, contemplate making some improvements to their plant at Johnstown, Pa., the extent of which, however, has not yet been decided upon.

A hot metal mixer with a capacity of 250 tons has recently been installed in the National works of the National Tube Company, McKeesport, Pa. A new converter has also been installed in the Bessemer plant at McKeesport, giving a total of three. Recently several carloads of blowing engines from MacIntosh, Hemphill & Co., Pittsburgh, were delivered to the National works, and other equipment will be coming in to this plant from time to time, the work of building large additions now being actively under way.

The question is now being debated among stockholders of the Emlyn Iron Works, Chicago, which made an assignment last week, whether to place the mill on the open market at the present time or to make a settlement by which the stockholders will make good outstanding accounts and retain the mill. The company have no merchandise liabilities, all outstanding bills having been paid except money borrowed from the Chicago National Bank and from individual stockholders. Their mill at East Chicago is comparatively new, having been erected less than four years ago, and equipped with the best modern machinery for rolling bars.

The Thomas Furnace Company, Milwaukee, Wis., blew out their furnace June 10, after the longest and most successful blast made by the furnace, which was originally built by the Minerva Furnace Company in 1872. The present company acquired the property about three years ago, and after extensive repairs commenced active operation in March, 1902, and the furnace has been in operation ever since. J. M. Thomas, the president of the company, says that extensive repairs and improvements will be made at the furnace and docks, which will increase the output, improve the product and economize in labor and fuel. A large stock of pig iron was accumulated before the shut down to care for customers during the time the furnace is closed.

Wickwire Brothers, Cortland, N. Y., are to erect two new buildings to take care of their increasing business. One of these will be 75 x 250 feet, three stories, and will be devoted to increasing the facilities for wire drawing and weaving. The other building, which will be used as a machine shop, will be 60 feet square and two stories high.

Spang, Chalfant & Co., Incorporated, operating the Etna Iron & Tube Works at Pittsburgh, have notified their puddlers of a reduction in puddling from \$5 to \$4.50 a ton. The men refused to accept the cut and went out on strike.

The Reliance Tube Company, Limited, recently organized at Pittsburgh, have started work on the building of a plant at Brackenridge, Pa., for the manufacture of small tubes.

The Bessemer plant of the Republic Iron & Steel Company at Youngstown, Ohio, was shut down last week for lack of orders, but is in operation again this week. The company expect to use the direct metal process at their Bessemer plant in the near future.

### General Machinery.

The Acme Wire Company, New Haven, Conn., have incorporated with a capital stock of \$100,000 for the manufacture of wire, machinery and electrical apparatus. The incorporators are: Victor M. Tyler of New Haven; Edgar L. Haltpence of Newark, N. J., and Herbert E. Flather of Rome, N. Y.

The recently incorporated Electric Safety Clutch Company, Akron, Ohio, have not yet decided what machinery they will install in their new plant.

It seems that the property at New Albany, Miss., donated by the citizens of that place to the Mobile, Jackson & Kansas City Railroad, is to be used for the construction of a four-stall roundhouse and not for repair shops, as was reported. It is the intention of the company, whose engineering offices are at Mobile, Ala., to use New Albany as a division point.

The Grant Mfg. & Machine Company, Bridgeport, Conn., recently incorporated, are erecting a two-story frame factory, 40 x 110 feet, on Silliman avenue, in which will be installed a 12 horse-power Miami gas engine for motor power. The company manufacture multiple spindle vertical tapping machines, bench filing machines, screw slotting machines, speed lathes, tool post grinding outfits and general light machine contract work, and also do light special machine work, such as envelope sealing machines, voting machines, typewriter, counting and registering machines. No new machinery is required.

Considerable new equipment will be required by Morris & Lewis, Rock Island, Ill., who are to erect a plant for the manufacture of brake shoes at Moline, Ill., where they have secured a 4-acre site upon which will be constructed a building, 100 x 200 feet, which will be used as a foundry and machine shop, and which, when completely equipped, including power plant, will cost about \$25,000. Work on the new shop will be commenced as soon as the Rock Island Railroad get through laying their switches to the plot. The firm have not yet prepared specifica-

tions for the equipment and do not know just what machinery, engines, boilers, &c., they will purchase.

Gould & Hedley, who have operated a machine shop at 100-103 Morgan street, Jersey City, N. J., for more than 15 years, have purchased a three-story and basement building at 113-115 Plymouth street, which they will occupy after making the necessary alterations.

The new shop being erected by the Chicago, Milwaukee & St. Paul Railroad at Davenport, Iowa, will be 40 x 117 feet. The contract for the construction of this building and several smaller ones has been let to the Walsh Construction Company, Davenport.

The Automobile Garage & Repair Company, Cleveland, have fitted up a large automobile repair establishment at 53 Huron street and expect soon to add a department for the manufacture of a number of varieties of automobile parts and specialties. They will purchase quite a large equipment of machine tools, including lathes, planers, punches and some automatic screw machinery. J. M. Belin is general manager of the company.

The Safety Steel Derrick Company, Bowling Green, Ohio, are closing down their plant in that place and are preparing to remove to a new plant which they have erected at Deshler, Ohio. The new plant comprises several new brick buildings erected to suit their own requirements. The company manufacture oil well machinery.

### Foundries.

The Salem Iron Foundry, Salem, Mass., have incorporated. The business has been established for 14 years. W. S. McIntire is president and treasurer.

The S. Obermayer Company, Cincinnati, Ohio, have recently shipped to the Scott-Oliver Car Company, Knoxville, Tenn., an entire foundry equipment, consisting of six carloads, including cupolas, blowers, ladles, tumbling mills, foundry facings and supplies of all kinds. The Scott-Oliver Foundry & Machine Shops will probably be one of the largest and best equipped plants south of the Ohio River.

The offices of the American Skein & Foundry Company, who have one of their principal foundries at Racine, Wis., are to be moved to Chicago.

The American Duplex Steel Company, Bradford, Pa., who commenced experiments two years ago to manufacture malleable iron and steel castings according to Hunter's process, are now placed on a commercial basis, and have a plant in operation at Bradford. The secretary and general manager is N. G. Paris, Jr. The United States Foundry & Sales Company, South Norwalk, Conn., are about to erect a 30-ton cupola at their plant.

A complete new equipment will be required by the Red Jacket Mfg. Company, Davenport, Iowa, who are about to start to erect a foundry, 85 x 200 feet. None of the machinery has been purchased.

The Norway Iron & Steel Company, York, Pa., incorporated in Pennsylvania in March, 1900, with \$200,000 capital stock, of which \$100,000 has been paid in, have made a mortgage to the Security Title & Trust Company of York, as trustees, to secure an issue of \$200,000 6 per cent. first mortgage gold bonds. The proceeds will be used for additions, improvements, &c. The foundry, with a cupola capacity of from 20 to 40 tons per day and a 10-ton open hearth steel furnace, produces steel and gray iron castings, including fish plates, rail braces, switch and signal castings, &c., and also architectural castings and structural iron work. The president is W. F. Bay Stewart; vice-president, J. W. Steacy; secretary, H. H. Weber; treasurer, C. C. Frick.

The new plant of the Delaware River Steel Casting Company, Chester, Pa., has been put in operation.

The Findlay Mfg. Company, recently incorporated at Findlay, Ohio, have purchased the old plant of the Van Buren, Heck & Marvin Company, and will conduct a foundry business. S. F. Fields, James Steen, D. H. Thomas, Edward C. Taylor, C. F. Spiece and others of Findlay are interested in the new company.

### Power Plant Equipment.

Sharkey & Peck, boiler manufacturers, are moving from 58 Law avenue, Chicago, to the new plant being erected for them at Eighteenth street and Western avenue. This plant, which will be ready for occupancy in about 30 days, will give the firm greatly enlarged facilities, with the advantage of an individual side track.

The Meriden Electric Light Company, Meriden, Conn., are installing a 380 horse-power Westinghouse engine, direct connected to a 200-kw. generator.

The Muskegon Boiler Works, Muskegon, Mich., contemplate the erection during the present summer of a new plant, to be of steel construction, with brick or concrete filling between the posts. The building will be 50 x 330 feet, with a 25-foot wing on the right hand side facing the front of the shop. The equipment will include an electric crane of from 12 to 15 tons capacity, with a 30-foot hoist.

The Myrick Machine Company, Olean, N. Y., have enlarged their machine shop one-third and doubled the capacity of their foundry. They have put up a new cupola and ratter and installed an electric light plant throughout the whole of the



works, operated by one of their own gas engines. Their general lines of manufacture are gas engines, tannery machinery and shaking grates.

The Canadian Westinghouse Company, Limited, Hamilton, Ontario, have recently closed a contract to furnish the Shawinigan Water & Power Company, Shawinigan Falls, P. Q., with a 6600-kw. two-phase, 2200 volt, 3600 alternations, 180 revolutions per minute, rotating field alternator, for direct connection with water wheel. Two 2200-kw. oil insulated water cooled transformers, 2200 volt primary, 50,000 volt secondary, are included in this contract.

The United States Engineer, Boston, Mass., will receive bids until July 11 for boilers, engines, generators, &c., for an electric light and power plant.

The Ostrander Steam Rotary Engine Company have been incorporated at Yonkers, N. Y., with capital stock of \$10,000, and will manufacture rotary engines. Incorporators: A. I. Ostrander, Yonkers; James Mallory, Wilmington, Del., and Jno. F. Cogan, New York.

The Department of the Interior, Office of Indian Affairs, Washington, D. C., will receive bids until July 21 for a power plant at the Genoa Indian School, including boilers, engines, dynamo, &c.

The Secor Engine Company, Waterford, N. Y., have been incorporated with a capital stock of \$500,000, with H. A. Shipman, George Isaksen and W. E. Powers as directors. Address H. A. Shipman, attorney, 180 Broadway, New York, who, we understand, is personally interested in the company.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until July 9 for two condenser sets for the Boston navy yard.

A company headed by P. M. Puhl of Perrysburg, Ohio; C. H. Hendricks of Toledo, and others, propose to erect a large hydraulic plant at Maumee, involving an expenditure of \$500,000. The company contemplate the supply of electric power for the operation of traction lines in the vicinity and for general manufacturing or farming purposes. Plans for the proposed plant have been completed, and it is claimed that work will start at once.

#### Bridges and Buildings.

The Syracuse Bridge Company, 226 The Bastable, Syracuse, N. Y., have incorporated with a capital stock of \$30,000, to contract for steel and concrete bridges and buildings, roof trusses, foundations and all kinds of structural steel work. A. H. Mallory is president, and G. B. Sickmon, secretary and treasurer.

The Finch Mfg. Company, Scranton, Pa., have booked the contract for the structural steel work of a new breaker to be erected by the Scranton Coal Company. This will keep the plant in continuous operation for three months.

Huston & Cleveland, Toledo, representing the American Bridge Company, have obtained a contract from the city of Toledo for repairing the Fassett street bridge in that city, which was partially destroyed by flood last winter. The cost of the new spans will be \$27,989, and the work will be completed by October.

#### Fires.

The plant of the Kline Mfg. Company, Minneapolis, Minn., was almost destroyed by fire recently. The loss is placed at \$20,000.

The Pecora Paint Works, S. Bowen & Sons, proprietors, Philadelphia, Pa., were partially destroyed by fire on the 21st inst. The loss to building and contents is estimated at \$10,000.

#### Hardware.

The Berbecker & Rowland Company, Waterville, Conn., are to erect a one-story addition to their plant, 33 x 120 feet.

The United States Marine Corps have just placed an order with the Ideal Mfg. Company, New Haven, Conn., for another quantity of complete outfits with which to equip the various marine corps stations, each set consisting of an Ideal loading press with appurtenances, Universal powder measure No. 5, Armory mold, bullet lubricator and Sizer lubrication, &c., all of which are to be used in reloading the 30/40 Krag service shell with the Ideal bullet No. 308,245, and a charge of 3 grains of Ladin & Rand's "Bull's-Eye" powder. Reloading ammunition of this description is said to be very accurate and cheap, showing a material saving over the cost of new cartridges.

The Trimont Mfg. Company, Boston, Mass., have decided not to remove their works to Junction, N. J., which town had made offers of site, exemption from taxes and other inducements in an attempt to get the company to locate there. The company will continue to manufacture at their Roxbury shops for the present, and may decide permanently to continue their location there. If so the shops will be enlarged, in order to provide the additional room which is necessary because of the growth of the business.

Barbee Wire & Iron Works, Lafayette, Ind., have recently purchased property, 40 x 132 feet, adjoining their plant, and will put up a three-story brick building, which will be in the nature of a wing or extension to their present factory.

Kelly Axe Mfg. Company, Alexandria, Ind., will begin moving their plant to Charleston, W. Va., in July. The municipality of that place have donated 53 acres of land to the company, and they are now engaged in putting up structures of brick and steel, and fire proof throughout. The Charleston plant will have a capacity of 12,000 axes per day, besides other products, and a very large force of workmen will be employed. The company consider the new location, with its many natural advantages, an ideal spot for manufacturing, and have chosen it after much deliberation. The diminishing natural gas supply in the Alexandria district made it necessary for the company to seek another site for their operations.

The Dominion Wire Mfg. Company, Montreal, Can., have recently been favored with some large orders for copper wire, including one for 1400 miles of wire from C. P. R. Telegraph Company. The company also furnished the first copper wire strung from coast to coast, aggregating a stretch of over 3000 miles. Another large order was for copper wire required for the transmission line that connects a score of towns along the north shore of the St. Lawrence, between Murray Bay and Quebec. But what is referred to as the largest order ever placed in Canada for copper wire was secured a short time since and amounts to 1,500,000 pounds, valued at about \$250,000. This order was given by the Toronto & Niagara Power Company, for the six cables to be erected for the transmission of power from the Falls to Toronto, the cables being strung on steel towers, 40 feet high and 400 feet apart.

It is announced that D. & H. Scovill, Higganum, Conn., are to erect a new factory, 40 x 262 feet. The company manufacture planters' hoes.

The United States Hardware Mfg. Company, Port Clinton, Ohio, have completed the foundations for the largest buildings of their plant and will commence on the structural work this week. They expect to utilize gas engines for power and will probably install three engines of 200 horse-power each. Two of these will drive generators, as it is the intention to operate machinery by motors. They will also use the electrical welding process extensively in the production of their hardware and harness specialties, and have placed contracts for several Thomson-Houston welding machines. In a great deal of their work they expect to do away with castings and will substitute sheet metal and wire stampings, welding the joints and making the pieces homogeneous by the electric welding process. The Corlett Engineering Company, Cuyahoga Building, Cleveland, are engineers for the company.

Simplex Washer Company, Davenport, Iowa, have incorporated with a capital stock of \$20,000, and have bought the buildings, machinery and stock of the Champion Mfg. Company of that city. The new company own the patents of Peter Bendixen, and will manufacture under these patents. The officers of the company are: Peter Dittmer, president; Peter Bendixen, vice-president; Paul Meyer, secretary, and B. J. Evers, treasurer and manager. They are preparing to manufacture a strictly first-class rotary washer, with a very simple, durable and rapid movement, and a stirrer that will reach all parts of the clothes to be washed.

R. S. Woodruff of New Haven, Conn., has been appointed permanent receiver of the Housatonic Mfg. Company, and the business will be continued under his direction. Over 200 hands are being employed at the present time, and considerable business is being done in tinned spoons, knives and forks, brass gas and electric holders, screw caps and other special goods which are being made to order.

The Schatt & Morgan Cutlery Company, Titusville, Pa., are about making additions to their factory rendered necessary by increase of business, which promises to double that of last year.

#### Miscellaneous.

Frank S. Simons has been appointed temporary receiver for the Caplan Iron & Steel Company, Detroit, Mich.

About the only equipment required by the Le Roy Plow Company, Le Roy, N. Y., who are to erect an additional foundry building, is an apparatus for opening and closing windows in the side of the ventilator, constructed on the ridge of the roof.

The Duff Mfg. Company, Allegheny, Pa., have just filled an order from the Pittsburgh Gage & Supply Company for 500 Barrett jacks.

The Babbitt Soap Company, New York, have purchased 87 acres of land at New Durham, N. J., as a site for their new plant. It will be remembered that a 4000 horse-power plant will be installed. As soon as they are settled in their new quarters the present works in New York will be placed on the market.

The General Railway Signal Company, Rochester, N. Y., have incorporated with a capital stock of \$5,000,000. This company are a consolidation of the Pneumatic Signal Company, Rochester, and the Taylor Signal Company, Buffalo, N. Y., the details of which were printed in these columns April 14.

The Erie Stove & Mfg. Company, Erie, Pa., have been incorporated with a capital of \$15,000. The incorporators are D. W. Nason, F. A. Mehleck, Jno. P. Skoog, J. E. Nason and S. W. Nason.

The Dominion Government has accepted the recommendation of the Harbor Board at Montreal that the \$2,500,000 system of steel freight sheds on Montreal wharves be awarded to Peter Lyall & Sons.

The Erie Basin Shipbuilding Company, Buffalo, N. Y., have been adjudged an involuntary bankrupt. The first meeting of the creditors will be held on July 1.

The plant of the Keystone Scale Works, at Beaver Falls, Pa., which has been in the hands of the courts on account of bankruptcy proceedings, has been sold to John Ohsman and others of Beaver Falls. The price paid for the plant was \$10,000, and it is to be placed in operation at once.

The William B. Pollock Company, Youngstown, Ohio, builders of heavy plate construction, have received a contract from the Washington Water Power Company, Spokane, Wash., for the building of a large stand pipe.

The Pressed Steel Pole Company, Pittsburgh, have been granted a charter with a capital of \$125,000, and will manufacture new type of trolley and telegraph poles under patents secured by C. L. Wilson, an employee of the Carnegie Steel Company at Homestead Steel Works. The new pole is formed from two pieces of pressed plate steel in a wedge shape. The two forms are bolted together and the construction thus secured gives great firmness when the pole is planted. It is claimed to be superior to the tubular pole. The company have made a contract with the Pressed Steel Car Company of Pittsburgh to make these poles until such time as their own plant is ready.

The Prudential Heating Company, Akron, Ohio, have been incorporated with \$10,000 capital stock by Frank Flebeger, Frank Knolte, A. G. Cripps, F. B. Theiss and F. A. Boron. They will manufacture hot water and steam boilers for house heating purposes. The boilers will be made in the plant of the Akron Foundry Company.

The Vosler Mfg. Company, Denver, Col., have incorporated with a capital stock of \$1,000,000, to place on the market a patented rail joint, the invention of N. G. Vosler, who is vice-president. W. R. Redman is president, and Gerald McDonald, secretary. It is not likely that the company will erect a plant, the intention being to sell the rights to other concerns on a royalty.

The Ensign Automobile Company are to locate at Union City, Conn., where they are to build a two-story shop, 30 x 50 feet.

The indebtedness of the bankrupt Conrad Motor Carriage Company, Buffalo, N. Y., will aggregate about \$100,000. The trustee in bankruptcy has received \$40,068 since he took charge of the business of the company and disbursed \$29,896. A first dividend of 5 per cent. to the creditors has been ordered paid.

F. E. Pfannmueller & Co., Chicago, have moved their pipe shop and warehouse to Wood street and the Pittsburgh, Cincinnati, Chicago & St. Louis Railway tracks, and have opened a downtown office at Room 733, The Rookery. The company make a specialty of light weight lap welded iron pipe, both asphalt coated and galvanized, with screw and socket and flange ends, which is particularly adapted for mining and irrigating purposes. In addition to this the company deal in new and rebuilt power equipment, such as engines, boilers and appurtenances.

The Tritt Electrical Mfg. Company have incorporated at South Bend, Ind., with a capital stock of \$15,000, to manufacture a line of electrical specialties. The incorporators are B. E. Tritt, A. H. Calvert and Chas. H. Kreighnaun.

The Naugatuck Chemical Company have purchased the Beach property of the United States Rubber Company, at Naugatuck, Conn., comprising 15 acres of land, and propose to erect a plant on the premises. The Chemical Company are incorporated under New York laws, with capital stock of \$100,000.

The Bostwick Steel Lath Company, Warren, Ohio, have voted to increase their capital stock from \$100,000 to \$200,000, and it is proposed to make improvements to the plant. Wm. G. Hurlburt has been elected president and treasurer and E. J. Jobe secretary of the company.

The merchants of West Mansfield, Ohio, have subscribed \$25,000 in stock to secure the plant of the Aughe Plow Company, Dayton. The factory will employ about 150 men.

The Ames-Bonner Company, Toledo, Ohio, have decided to proceed at once with the erection of a new factory, to cost \$100,000, on a site purchased some time ago at West Toledo. The present plant is inadequate in size, and the fact that it was flooded by high water last winter was a determining factor in the change.

The Toledo Metal Fixture Company, Toledo, Ohio, capital stock \$10,000, have been chartered by John Milens, C. F. Frankhauser, E. E. Perry, James S. S. Emory and L. J. Hocker of Toledo. The company have secured a factory on South St. Clair street and will engage in the manufacture of sheet metal goods, such as pie and cake racks for bakers, springs for buggy cushions and spring beds, and they expect to install machinery for turning out mattress fixtures.

The Andrews Wire & Iron Works, Rockford, Ill., have plans prepared for a new plant that will be twice the size of the present one. The main building will be 68 x 148 feet, two

stories high, and adjacent to it will be a triangular building, 49 x 68 x 67 feet, which will be used for the engine and boiler room and storage of wire. The new buildings are being erected principally to protect the machinery, which is at present housed in a wooden structure, so there will be very little new machinery required. A 140 horse-power boiler, 75 horse-power engine and motors will be installed, the machinery to be driven by motors in gangs.

The Newburg Brick Company, Cleveland, are erecting a \$65,000 plant for the manufacture of pressed brick. Among other machinery they will install 200 to 250 horse-power of boilers and engines.

## Trade Publications.

**Weights of Rolled Iron and Steel.**—A book of 32 pages which will be found very useful by iron and steel workers has been issued by Eggleston Brothers & Co., iron and steel merchants, 106 South street, New York. It contains tables giving the weight per lineal foot of rounds, squares, flats, even and uneven angles, tees, zees, small channels, black and galvanized sheets, hoops and bands, ovals, half ovals, half rounds, round edge tire, &c., covering a great range of sizes; also rules for estimating weights, and other useful information.

**Vulcan Steel.**—The Vulcan Crucible Steel Company, Alliquippa, Pa., have issued, for distribution to the trade, a catalogue of their products, which also includes classification lists of tool steel, crucible spring and machinery steel, open hearth machinery steel, cutlery steel, file steel, useful tables of weights, &c. The company are manufacturers of Vulcan tool steel and miscellaneous steels for general purposes, made of crucible and high grade acid open hearth steel. The Vulcan tool steel is made in five different grades and nine tempers to cover requirements for all purposes.

**Friction Clutches.**—The Carlyle Johnson Machine Company, Hartford, Conn., have issued an attractive catalogue of their line of Johnson friction clutches. The work is fully illustrated, to show the clutch in all its mechanical details, and contains a complete description of the various uses to which the device is adapted, such as gas engine connections, countershafts and line shafts and embodied in machines that require clutch mechanism.

**Iron and Steel Works Machinery.**—Catalogue No. 14 of the Lewis Foundry & Machine Company, Pittsburgh, Pa., is a comprehensive booklet showing various forms of iron and steel works machinery, chill and sand rolls and special machinery as made by this company. Numerous illustrations are given of lever, vertical, side cutting, plate, bloom and billet and miscellaneous shears; horizontal punch, double bending and straightening machines; roll lathes, angle straightener, ore and clay mill; underground and sliding hot saws; plate bending rolls; squeezer; reversing engine; pinion roll, and sheet mill housings, as samples of an extended line of machinery of this class which is manufactured.

**Electrical Grinders and Fans.**—Bulletins Nos. 3054 and 3056 from the Emerson Electric & Mfg. Company, St. Louis, Mo., deal respectively with electric tool grinders for direct current in bench, column and bracket form, and direct connected exhaust fans for both alternating and direct current.

**Engines and Boilers.**—A new catalogue on these subjects has been received from James Leffel & Co. of Springfield, Ohio. It is a book that will interest those who have to do with steam power, and goes into the matter of building engines and boilers in considerable detail. Numerous full page and smaller illustrations are used, with such detailed information as will make it truly valuable.

**Electrical Machinery.**—The Crocker-Wheeler Company of Ampere, N. J., in their bulletin No. 45, recently issued, give an abstract of a series of articles on the electrical equipment of the Government printing office, which appeared in the *Electrical World and Engineer*. Views are given of the power plant and various applications of motor drive to presses, routers and switches, and the text gives an interesting account of these features as employed in this the largest printing office in the world.

### NOTES.

We have received from George G. Blackwell's Sons & Co., Limited, Liverpool, England, two circulars relating to the high grade alloys manufactured by the firm for the steel trade. The alloys comprise ferrochrome, ferrotungsten, ferronickel, ferromolybdenum, chrome nickel, tungsten nickel, molybdenum nickel, &c. One of the circulars reproduces an illustrated article from the *London Iron and Coal Trades Review* relating to the supply of iron and steel alloys, which pays a high compliment to the firm named for the conspicuous part played in the development of the trade in these alloys.

The Perkins Machine Company, Warren, Mass., formerly of South Boston, Mass., have issued a new catalogue of 176 pages, setting forth their line of presses, with numerous and comprehensive illustrations which demonstrate the mechanical features of the tools.

The June issue of *Something Pneumatic*, published by the Chicago Pneumatic Tool Company, is illustrated with views of their various plants, as well as with representations of their machines at work on various noteworthy contracts. It also contains the text of the decision of the United States Circuit Court of the Southern District of New York in the Philadelphia Pneumatic Tool Company suit.



## The Iron and Metal Trades

From very influential quarters there have come reports widely quoted that there has been an improvement in the amount of orders, and that the worst is over. It is difficult to trace any actual data upon which to base such a conclusion, although many in the trade are in a receptive mood for anything which will encourage a change of sentiment in others. Sifted down, it comes to this, that the bond houses in Wall street are doing more and feel encouraged, and this is regarded as the first step toward a better condition.

But it would be idle to claim that business has increased in the iron trade or that the immediate outlook is perceptibly better. On the contrary, some branches which have been active with the spring business have been falling off, and the independent mills, notably in the Wire industry, are cutting to keep running fully. The Tin Plate mills are very busy, the leading interest having 92 to 93 per cent. of the capacity at work. The Sheet interest is less favorably placed, and concessions are being freely made. During the spring 62 per cent. of the capacity of the consolidated works was operating. Now it has dropped back to 53 to 54 per cent. The negotiations with the Amalgamated Association are in progress, but possess comparatively little interest for the trade.

Taking it all around, the Pig Iron markets are a little weaker. A moderate tonnage has been placed, interest centering more particularly on the bidding on one lot of 9500 tons in the Central West. Quite some good sized inquiries are in the market, but are heading up rather slowly. We cannot expect much relief from export sales of Pig Iron. It does not look as though the tonnage would amount to much unless our prices drop more rapidly than those of Middlesbrough. We are still apart now and even in the Mediterranean there is not much tonnage. Any large movement would also tend to put freights to a prohibitive figure.

Reports from the Cast Iron Pipe trade, long a conspicuous exception in the chorus of the afflicted, have been rather unfavorable lately.

Some good Structural tonnage is coming out lately in the Pittsburgh district, a part having been already taken, but the amount of bridge work offering is very small. On building work very low prices are being made on fabrication.

The Billet, Structural and Plate pools are to meet in this city early next month, but no radical action is expected. The feeling is that the time has long passed when a lowering in prices by agreement would have any stimulating effect on consumption.

## A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,  
Declines in Italics.

At date, one week, one month and one year previous.

June 22, June 15, May 25, June 24,  
1904. 1904. 1904. 1903.

### PIG IRON:

|  |         |         |         |         |
|--|---------|---------|---------|---------|
| Foundry Pig No. 2, Standard Philadelphia .....                   | \$14.50 | \$14.50 | \$14.50 | \$18.75 |
| Foundry Pig No. 2, Southern, Cincinnati .....                    | 11.75   | 11.75   | 12.00   | 17.25   |
| Foundry Pig No. 2, Local, Chicago Bessemer Pig, Pittsburgh ..... | 13.25   | 13.25   | 13.50   | 19.00   |
| Gray Forge, Pittsburgh .....                                     | 12.50   | 12.85   | 13.35   | 19.35   |
| Wire Rods, Pittsburgh .....                                      | 12.15   | 12.35   | 12.50   | 18.50   |
| Lake Superior Charcoal, Chicago                                  | 14.50   | 14.50   | 15.00   | 24.00   |

### BILLETS, RAILS, &c.:

|                                   |       |       |       |       |
|-----------------------------------|-------|-------|-------|-------|
| Steel Billets, Pittsburgh .....   | 23.00 | 23.00 | 23.00 | 28.50 |
| Steel Billets, Philadelphia ..... | 24.00 | 24.00 | 24.00 | 30.00 |
| Steel Billets, Chicago .....      | 23.00 | 23.00 | 24.00 | 29.50 |
| Wire Rods, Pittsburgh .....       | 29.00 | 29.00 | 30.00 | 36.00 |
| Steel Rails, Heavy, Eastern Mill  | 28.00 | 28.00 | 28.00 | 28.00 |

### OLD MATERIAL:

|                                     |       |       |       |       |
|-------------------------------------|-------|-------|-------|-------|
| O. Steel Rails, Chicago .....       | 9.50  | 9.50  | 10.00 | 17.00 |
| O. Steel Rails, Philadelphia .....  | 11.25 | 11.25 | 12.00 | 21.00 |
| O. Iron Rails, Chicago .....        | 14.50 | 14.50 | 14.00 | 20.00 |
| O. Iron Rails, Philadelphia .....   | 14.50 | 14.50 | 15.00 | 23.00 |
| O. Car Wheels, Chicago .....        | 10.50 | 11.00 | 12.50 | 21.50 |
| O. Car Wheels, Philadelphia .....   | 11.00 | 11.00 | 12.00 | 21.50 |
| Heavy Steel Scrap, Pittsburgh ..... | 11.00 | 11.50 | 11.75 | 20.00 |
| Heavy Steel Scrap, Chicago .....    | 9.00  | 9.50  | 9.50  | 16.50 |

### FINISHED IRON AND STEEL:

|  |       |       |       |       |
|--|-------|-------|-------|-------|
| Refined Iron Bars, Philadelphia .....  | 1.48½ | 1.48½ | 1.48½ | 1.75  |
| Common Iron Bars, Chicago .....        | 1.27½ | 1.30  | 1.35  | 1.70  |
| Common Iron Bars, Pittsburgh .....     | 1.30  | 1.35  | 1.35  | 1.75  |
| Steel Bars, Tidewater .....            | 1.49½ | 1.49½ | 1.49½ | 1.75  |
| Steel Bars, Pittsburgh .....           | 1.35  | 1.35  | 1.35  | 1.60  |
| Tank Plates, Tidewater .....           | 1.74½ | 1.74½ | 1.74½ | 1.78  |
| Tank Plates, Pittsburgh .....          | 1.60  | 1.60  | 1.60  | 1.60  |
| Beams, Tidewater .....                 | 1.74½ | 1.74½ | 1.74½ | 1.73½ |
| Beams, Pittsburgh .....                | 1.60  | 1.60  | 1.60  | 1.60  |
| Angles, Tidewater .....                | 1.74½ | 1.74½ | 1.74½ | 1.73½ |
| Angles, Pittsburgh .....               | 1.60  | 1.60  | 1.60  | 1.60  |
| Skelp, Grooved Steel, Pittsburgh ..... | 1.35  | 1.35  | 1.40  | 1.90  |
| Skelp, Sheared Steel, Pittsburgh ..... | 1.35  | 1.35  | 1.40  | 2.00  |
| Sheets, No. 27, Pittsburgh .....       | 2.05  | 2.05  | 2.10  | 2.65  |
| Barb Wire, f.o.b. Pittsburgh .....     | 2.50  | 2.50  | 2.50  | 2.60  |
| Wire Nails, f.o.b. Pittsburgh .....    | 1.90  | 1.90  | 1.90  | 2.00  |
| Cut Nails, f.o.b. Pittsburgh .....     | 1.75  | 1.75  | 1.75  | 2.15  |

### METALS:

|   |        |        |       |        |
|---|--------|--------|-------|--------|
| Copper, New York .....                                    | 12.62½ | 12.62½ | 13.00 | 14.50  |
| Spelter, St. Louis .....                                  | 4.60   | 4.60   | 4.90  | 5.55   |
| Lead, New York .....                                      | 4.20   | 4.20   | 4.35  | 4.12½  |
| Lead, St. Louis .....                                     | 4.10   | 4.10   | 4.27½ | 3.95   |
| Tin, New York .....                                       | 25.50  | 26.20  | 27.50 | 28.12½ |
| Antimony, Hallett, New York .....                         | 7.25   | 7.25   | 7.00  | 6.75   |
| Nickel, New York .....                                    | 40.00  | 40.00  | 40.00 | 40.00  |
| Tin Plate, Domestic, Bessemer, 100 pounds, New York ..... | 3.64   | 3.64   | 3.64  | 3.99   |

## Chicago.

FISHER BUILDING, June 22, 1904.—(By Telegraph.)

Whether or not we have reached the bottom of the psychological depression which has seized hold of the business world is impossible to tell. The American people have acquired the habit of expecting hard times and talking hard times during Presidential years and thus have brought about the very condition of affairs that they feared. The time will come sooner or later when the industrial world will recognize the absurdity of a pessimistic view at a time when the country is rich and all factors, aside from the mental one, speak for business activity. Meanwhile there is but little encouragement to report in this market. Pig Iron is weaker in tone, with lower than \$9 done on Southern Iron, and we have failed to realize the buying movement which was anticipated when Iron should reach \$9. Railroads have amazed the trade by insisting on restoring the higher rate from Birmingham existing before May 1, in the face of conditions which warrant a reduction rather than an increase. Northern Iron shares the weakness of Southern Iron, and there is little buying in either Northern or Southern. Billets are in extremely slow demand, with pool prices holding nominally only. Structural Materials are unchanged in price, but in very slow demand. Rails are fairly active in 40-lb. Sections and lighter and Track Supplies are claimed to be in excellent demand. Persistent claims are made that members of the Plate pool are shading prices, though if they are doing so it is in the nature of rebates or is kept well under cover. Sheets are by no means strong at the reduced prices quoted last week. Bars are in fairly active demand, with Iron offered on the basis of 1.27½c. to 1.32½c. and Steel held by the association mills pretty generally at 1.35c., Pittsburgh, or 1.51½c., Chicago, \$1 to \$2 per ton better being done by

the International Harvester Company. Pipe is active compared with other lines of Steel and Iron. Boiler Tubes are as sluggish as they well could be. Cast Iron Pipe is in slow demand, with buyers waiting for lower prices. Old Materials have sagged another 50c. for nearly half the items on the list. Metals are weak and lower in price. Wire products are offered at lower prices by independents, who have caught up with their orders and are now looking for new business.

**Pig Iron.**—The buying movement that was hoped for when the \$9 mark should be squarely reached has failed to materialize, and although foundry yards are empty, there seems to be little more disposition to buy beyond daily needs than there has been in the past. Some fairly good inquiries are being figured on and some Southern Iron is being sold on the basis of \$9 to \$9.25, Birmingham. One sale of something less than 1000 tons was closed last week at \$8.75, Birmingham, for Iron to run from 1.75 to 2.25 silicon. By some furnaces this is rated as No. 2 and by others it would be called No. 3. To the astonishment of everybody, the railroads that reduced the freight rate on Southern Iron to \$1.40 north of the river, or \$3.65 from Birmingham, have decided to restore the old rate, making the through freight rate from Birmingham to Chicago \$3.85, as it was before May 1. Iron shipped before July 1 from Birmingham will be billed through at the lower rate. If there ever was a time when Southern furnaces needed help from the railroads it is now when Northern Iron is growing weaker every day as the result of the depression in Ore prices, the defeat of the lake captains and the slackness of demand for Iron. With Southern Iron offered in this market at from \$12.85 to \$13.10, plus switching charges, and Northern Iron delivered direct to the consumer at \$13.25 or less, it is plain to see where the orders will go. The International Harvester Company are in the market tentatively for about 30,000 tons of Iron, in spite of the fact that they have their own Ore properties and blast furnaces, and it is not unlikely that they may buy Iron cheaper than they could make it. On every hand we hear talk of restriction of output, but particularly so from the Ohio furnaces. A good many of the stacks of the United States Steel Corporation are banked or out of blast, and the tendency seems to be to reduce production to the lowest possible point until prospects brighten both for Pig Iron and for Finished Material. We repeat last week's quotations with the exception of Southern Basic Iron, which we advance to the basis of \$9.50, Birmingham, because the Tennessee Company are the only ones who can furnish that Iron in this market, inasmuch as the Alabama Steel & Wire Company have withdrawn from the market, as the latter company are about to convert their own Iron into Steel, and the Tennessee Company are consistent in asking \$9.50 for both their Basic and their No. 2 Foundry. We quote:

|   |                    |
|---|--------------------|
| Lake Superior Charcoal.....   | \$14.50 to \$15.50 |
| Northern Coke Foundry, No. 1.....                                   | 13.75 to 14.00     |
| Northern Coke Foundry, No. 2.....                                   | 13.25 to 13.50     |
| Northern Coke Foundry, No. 3.....                                   | 13.00 to 13.25     |
| Northern Scotch, No. 1.....   | 14.00 to 14.25     |
| Ohio Strong Softeners, No. 1.....                                   | 15.05 to 15.30     |
| Ohio Strong Softeners, No. 2.....                                   | 14.55 to 14.80     |
| Southern Silvery, according to Silicon.....                         | 14.15 to 15.15     |
| Southern Coke, No. 1.....   | 13.15 to 13.40     |
| Southern Coke, No. 2.....   | 12.65 to 13.15     |
| Southern Coke, No. 3.....   | 12.40 to 12.65     |
| Southern Coke, No. 4.....   | 12.15 to 12.40     |
| Southern Coke, No. 1 Soft.....                                      | 13.15 to 13.40     |
| Southern Coke, No. 2 Soft.....                                      | 12.65 to 13.15     |
| Southern Gray Forge.....  | 11.90 to 12.15     |
| Southern Mottled and White.....                                     | 11.90 to 12.15     |
| Malleable Bessemer.....   | 13.75 to 14.00     |
| Standard Bessemer.....  | 14.80 to 15.05     |
| Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon..... | 16.30 to 18.30     |
| Alabama Basic.....  | ..... to 13.15     |
| Virginia Basic.....   | 13.85 to 14.10     |

**Billets.**—Nothing new has developed in the Billet market and but little trading is being done. It is coming to be understood more and more that the pool price of \$24 per gross ton, Chicago, is nominal; that all large users of Rolling Billets are securing their Billets on sliding scale contracts based on the price of Pig Iron, and the smaller users of Forging Billets are able to buy most of their sizes from independents at a concession of \$1 or more below the pool price.

**Rails and Track Supplies.**—The leading producers of Rails express themselves as pleased with the last week's business, particularly in Light Rails and Track Supplies. But little new business has been placed in Standard Sections and roads are slow to specify on contracts. Standard Sections are still sold on the \$28 basis, while Light Sections seem to range between \$22.50 for 35-lb. and \$25 for 12-lb. sizes. Angle Bars are quoted at 1.35c. to 1.40c.; Spikes at 1.70c. to 1.75c., base, in car lots from mill, and 1.85c. to 1.90c. in small lots from store; Track Bolts remain at 2.20c. to 2.30c., base, in car lots from mill, with Square Nuts, and 10c. to 15c. extra for Hexagon Nuts. About 15c. to 20c. higher is charged for Track Bolts from store.

**Structural Material.**—The Hansell-Elcock Company secured the contract for the Steel work on the Patten Build-

ing, aggregating about 1400 tons. Several other large buildings are being figured on, but have not been placed thus far. Aside from this, the Structural Steel business has been extremely quiet, particularly because railroads are deferring the erection of Steel bridges. The hope is expressed that after July 1 when the roads have made up their annual statements some sort of a buying movement will begin, particularly as it is understood that large Western roads have been heavy borrowers in the East. Prices are unchanged, as follows: I-Beams and Channels up to and including 15 inches and Angles 3 inches on one leg and larger, 1.76½c., Chicago; Tees, \$1 per ton extra. Store prices on Structural are as follows: Angles, Beams, Channels and Zees, base sizes, 2c. to 2.10c.; Tees, 2.05c. to 2.15c., either random lengths or cut to lengths 5 feet and over.

**Plates.**—The Plate business has been very quiet, and inquiries which created a slight flurry last week have failed to materialize in orders. Two or three independent makers of Plates, 6 inches and narrower, are taking business regardless of association prices at whatever figure will close the deal. Universal Mill Plates are sold by one or two large independent mills on the basis of Bars instead of Plates, making the price 1.35c., Pittsburgh, without extras for width or thickness. Association prices are as follows: Tank Steel, ¼-inch and heavier, 1.76½c.; Flange Steel, 1.86½c.; Marine, 1.96½c.; Universal Mill Plate, 1.76½c. to 1.81½c.; 3-16 Tank, 1.86½c.; Nos. 7 and 8, 1.96½c. to 2.01½c. Lighter than No. 8 prices have been reduced sharply, No. 10 Tank going as low as 1.76½c. and Nos. 11 and 12 at 1.86½c. Store prices have been reduced on the lighter gauges, and all gauges from No. 10 up to the heaviest are now sold on the basis of 2c. to 2.10c., Chicago, with the usual extras for Plates wider than 100 inches. Flange quality still sells at 25c. premium above tank.

**Sheets.**—There is a tendency to cut prices still further on 20 gauge and heavier, although we repeat last week's prices without a change, as there does not seem to be enough trading to make a definite market. We quote: One Pass Cold Rolled Blue Annealed, Nos. 9 and 10, 1.76½c.; Nos. 11 and 12, 1.86½c.; Nos. 13 and 14, 1.91½c.; Nos. 15 and 16, 2.01½c. On One Pass Cold Rolled Box Annealed Sheets, 18 gauge and lighter, the following prices seem to prevail: Nos. 18 and 20, 2.06½c. to 2.11½c.; Nos. 22 and 24, 2.11½c. to 2.16½c.; No. 26, 2.16½c. to 2.21½c.; No. 27, 2.21½c. to 2.26½c.; No. 28, 2.31½c. to 2.36½c.; No. 29, 2.46½c. to 2.51½c.; No. 30, 2.56½c. to 2.61½c. Store prices on Sheets have been reduced \$2 per ton as predicted last week, the new schedule being as follows: No. 10 and heavier, 2c. to 2.10c.; No. 12, 2.05c. to 2.15c.; No. 14, 2.10c. to 2.20c.; No. 16, 2.20c. to 2.30c.; No. 18, 2.30c. to 2.40c.; No. 20, 2.30c. to 2.40c.; No. 22, 2.35c. to 2.45c.; No. 24, 2.40c. to 2.50c.; No. 26, 2.50c. to 2.60c.; No. 27, 2.60c. to 2.70c.; No. 28, 2.70c. to 2.80c.; No. 29, 2.85c. to 2.95c. Galvanized Sheets are extremely weak, the ruling discounts being 80 and 5 to 80 and 10, Pittsburgh, for carload shipments from mill, and 75, 10 and 5 to 80 per cent. discount for smaller lots from store, Chicago.

**Bars.**—Bar Iron may be quoted at 1.27½c. to 1.32c., Chicago, base, half extras, in car lots, although there are some makers who refuse to sell at less than 1.35c., and claim to be able to get the higher price because of the reputation of the quality of their Bars. Steel Bars are unchanged at 1.35c., base, half extras, Pittsburgh, or 1.51½c., Chicago, on the part of association producers, although the International Harvester Company and other independents are shading this price \$1 to \$2 per ton. Hoops should have been quoted last week at 1.71½c. rates, full extras, as Hoop makers advanced their price 15c. per 100 lbs. This advance was made because certain gauges of Hoops have been cheaper than Bands. It is stated that the advance was made without warning, and that large users were not given an opportunity to cover requirements before it was made. So little business is going in Hoops nowadays that price does not cut much figure. Store prices are as follows: Iron Bars, 1.75c., base, full extras; Steel Bars, 1.70c. to 1.80c., base, half extras; Hoops, 2.10c. rates, full extras.

**Merchant Steel.**—The Shafting Association seems to have reaffirmed prices, as no notifications to the contrary have reached Chicago. Business is naturally quiet in Steel such as is used by agricultural implement manufacturers because of the lateness of the season. The machinists' strike, while practically settled as far as the unions are concerned, is still curtailing the amount of Tool Steel and kindred lines bought by machine shops. Crop reports continue to be favorable, and a prospect for a good autumn trade is being forecasted in a fairly active inquiry on the part of implement concerns for fall delivery. Prices remain unchanged, as follows: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.76½c. to 1.81½c.; Smooth Finished Tire, 1.71½c. to 1.76½c.; Sleigh Shoe, flat, 1.56½c. to 1.61½c.; Sleigh Shoe, concave and convex, 1.66½c. to 1.71½c.; Cutter Shoe, 2.25c. to 2.35c.; Toe Calk Steel, 2.06½c. to 2.11½c.; Crucible Tool Steel, 6½c. to 8c.; special grades of Tool Steel, 13c. and up; Shaft-



ing at 52 per cent. in car lots and 47 per cent. in less than car lots.

**Merchant Pipe.**—A fair business is being booked in Pipe, and while it is by no means as active as it was earlier in the season, it is still better than other lines of Iron and Steel. Some price concessions are being made by independent producers, usually for the benefit of the jobbers. Prices are unchanged, as follows:

|                     | Steel Pipe. |           | Guar. Wr'ght Iron. |           |
|---------------------|-------------|-----------|--------------------|-----------|
|                     | Black.      | Galv.     | Black.             | Galv.     |
|                     | Per cent.   | Per cent. | Per cent.          | Per cent. |
| 1½ to 2 inch.....   | 67.35       | 67.35     | 64.35              | 54.35     |
| 2½ inch.....        | 70.35       | 69.35     | 67.35              | 57.35     |
| 3½ to 6 inches..... | 74.35       | 64.35     | 71.35              | 61.35     |
| 7 to 12 inches..... | 69.35       | 59.35     | 66.35              | 56.35     |

**Boiler Tubes.**—The Mark Mfg. Company, who bought the Eastern Tube Company's mill at Zanesville, Ohio, will shortly engage in the manufacture of Boiler Tubes as well as Pipe at that mill, and they promise to be something of a factor in the trade, although their policy has always been conservative with regard to prices. The Boiler Tube business is very slow and prices are being cut deeply, particularly on Charcoal Iron Tubes. We quote:

|                      | Steel. |       | Iron.  |       | Seamless Steel.     |
|----------------------|--------|-------|--------|-------|---------------------|
|                      | Black. | Galv. | Black. | Galv. |                     |
| 1 to 1½ inches.....  | 43.35  | 40.80 | 43.35  | 40.80 | 52.35               |
| 1½ to 2½ inches..... | 55.85  | 38.35 | 55.85  | 40.35 | 43.35               |
| 2½ inches.....       | 58.35  | 43.35 | 43.35  | 43.35 | 43.35               |
| 2½ to 5 inches.....  | 64.35  | 50.85 | 50.85  | 50.85 | { up to 4 in. 50.85 |
| 6 to 13 inches.....  | 55.85  | 38.35 | 38.35  | 38.35 | .....               |

Warehousemen profess to be satisfied with the amount of business they are doing from store. Prices are unchanged, as follows:

|                          | Steel. |       | Iron.  |       | Seamless Steel. |
|--------------------------|--------|-------|--------|-------|-----------------|
|                          | Black. | Galv. | Black. | Galv. |                 |
| 1 to 1½ inches.....      | 40     | 35    | 35     | 37½   | 37½             |
| 1½ to 2½ inches.....     | 50     | 32½   | 32½    | 35    | 35              |
| 2½ to 5 inches.....      | 60     | 45    | 45     | 45    | 45              |
| 6 inches and larger..... | 50     | 32½   | 32½    | 32½   | 32½             |

**Cast Iron Pipe.**—We must record another week of inactivity, as is to be expected when Pig Iron prices are on the down grade. Prices, nominally at least, are unchanged, as follows: \$25.50 the maximum for 4-inch Water Pipe and \$24.50 for 6-inch and heavier, and \$1 extra for Gas Pipe. Inquiries for 500 to 1000 ton lots would develop lower prices than these.

**Old Materials.**—The tendency is still downward in Old Materials and business is very light. It is believed that the bulk of the buying now being done is speculative buying on the part of dealers, who are filling up their yards with materials at the present low prices to be drawn upon when demand shall awaken. The largest railroad list of this week is 4000 tons from the Chicago, Burlington & Quincy. The Union Pacific offers about 1000 tons, the Chicago & Eastern Illinois 500 tons and the Rock Island about 250 tons. We name reductions of 50c. per ton on odd lengths of Old Steel Rails, Old Car Wheels, Heavy Melting Steel, Mixed Steel, Wrought Pipe and Flues and Machine Shop Turnings, with slight reductions on Iron and Steel Axle Turnings, making current quotations as follows, per gross ton, Chicago, carload lots:

|  |                    |
|--|--------------------|
| Old Iron Rails.....                              | \$14.50 to \$15.00 |
| Old Steel Rails, 4 feet and over.....            | 10.50 to 11.00     |
| Old Steel Rails, less than 4 feet.....           | 9.50 to 10.00      |
| Heavy Relaying Rails, subject to inspection..... | 22.00 to 23.00     |
| Heavy Relaying Rails, for side tracks.....       | 18.00 to 20.00     |
| Old Car Wheels.....                              | 10.50 to 11.00     |
| Heavy Melting Steel Scrap.....                   | 9.00 to 9.50       |
| Mixed Steel.....                                 | 8.00 to 8.50       |

The following quotations are per net ton:

|   |                    |
|---|--------------------|
| Iron Fish Plates.....                       | \$12.00 to \$12.50 |
| Iron Car Axles.....                         | 15.00 to 15.50     |
| Steel Car Axles.....                        | 13.50 to 14.00     |
| No. 1 Railroad Wrought.....                 | 10.50 to 11.00     |
| No. 2 Railroad Wrought.....                 | 9.00 to 9.50       |
| Shafting.....                               | 12.50 to 13.00     |
| No. 1 Dealers' Forge.....                   | 8.00 to 8.50       |
| Wrought Pipe and Flues.....                 | 7.00 to 7.25       |
| Iron Axle Turnings.....                     | 7.00 to 7.25       |
| Soft Steel Axle Turnings.....               | 7.00 to 7.25       |
| Machine Shop Turnings.....                  | 6.25 to 6.75       |
| Cast Borings.....                           | 3.00 to 3.50       |
| Mixed Borings, &c.....                      | 3.00 to 3.50       |
| No. 1 Mill.....                             | 6.00 to 6.50       |
| Country Sheet.....                          | 5.00 to 5.50       |
| No. 1 Boilers, cut to Sheets and Rings..... | 7.50 to 8.00       |
| Heavy Cast Scrap.....                       | 8.75 to 9.25       |
| Stove Plate and Light Cast Scrap.....       | 7.50 to 8.00       |
| Railroad Malleable.....                     | 8.25 to 8.75       |
| Agricultural Malleable.....                 | 7.75 to 8.00       |

**Metals.**—Weakness still characterizes the market, though local trading is said to be fairly active. Casting Copper is unchanged at 12¼c. and Lake at 13c. Pig Tin has lost another \$1 per 100 lbs., being now quoted at 27c. to 27¼c. Pig Lead is unchanged at 4.20c. for 50-ton lots, 4.30c. for car lots and 4.50c. for less than car lots. Spelter has dropped about 15c., being now quoted at 4.90c. to 5c. for car lots and 5.10c. to 5.25c. for small lots. Sheet Zinc is unchanged at 5.90c. for car lots of 600-lb. casks and 6.15c. to 6.20c. for less than car lots. Old Metals are weak, with Copper Clips reduced ¼c.; Red Brass Borings, ¼c.; No. 1 Pewter, 1c., and Block Tin Pipe, 1c. We quote: Copper Wire and

Heavy, 10¼c. to 10½c.; Copper Bottoms, 9¼c.; Copper Clips, 10½c.; Red Brass, 9¼c.; Red Brass Borings, 7¼c.; Yellow Brass, Heavy, 7¼c.; Yellow Brass Borings, 6c.; Light Brass, 5¼c.; Tea Lead, 3½c.; Zinc, 3.75c.; Pewter, No. 1, 16¼c.; Block Tin Pipe, 21c.

**Coke.**—The tracks are almost clear of demurrage Coke and Eastern shippers seem at last to have learned that while Chicago is a pretty fair dumping ground there are limits to its capacity for assimilation, and they are holding their Coke in cars on track at the ovens, instead of sending it to Chicago. Connellsville producers are endeavoring to sell their Coke on the basis of \$2 at the ovens for 72-hour Foundry grade, and this price is pretty generally held for contracts for future delivery; but buyers of spot Coke are able to do at least 25c. better. Some demurrage Coke is still offered on the basis of \$3.75, Chicago, as against \$3.50 last week. The L. & N. road is credited with having hauled more Coke than any other Coke road and to have kept the Wise County, Va., ovens busy at a time when ovens in other districts were slack. This was accomplished, as is well known, by their low rate of \$2.25 per ton, as against \$2.65, the rate to Chicago from other districts named by other roads.

## Philadelphia.

FORREST BUILDING, June 21, 1904.

The situation in the Iron market is practically the same as it was a week ago. Prices are nominally unchanged, but the undertone is weak and it would be no surprise to see some important changes in the near future. Everything seems to be just hanging on, simply because there is no business to make it worth while to change prices. Some people think that there should be a considerable demand in the near future to even up the dullness of the past several weeks, but against that nobody seems to want material at any price. That it will be wanted sooner or later goes without saying, but there is no means of knowing what may happen before it is wanted. Every day of dullness adds to the weakness, and if it continues much longer it is hard to see how it will be possible to avoid a bad break in prices. This applies not only to Pig Iron, but to the more advanced products as well, and in some cases perhaps to a greater extent than in Pig Iron. Such a revision would not be an unmixed evil if it would start things up, but there is no certainty that even a reduction in prices would increase the volume of business. It might do so temporarily, but the Iron trade does not depend on buying and selling for any given period as much as it does on consumption for a long period. What is needed is increased consumption. At the present time it is not a question of price; if it was it would soon be settled; but the vital point is to determine how much Iron will the country be able to consume during the next six months. The entire situation hinges on that point. Production during the past quarter has been too large, and as it is believed that consumption during the third quarter will be smaller than any similar period during several years, it will be a most difficult matter to adjust the supply in proportion to legitimate requirements. Prices, of course, will also require similar adjustment, but to what extent it is impossible to say. In the meanwhile there are no evidences of pressure to either buy or sell, although business would be gladly accepted if it could be had; but it is considered useless to offer stuff around until there is some prospect of its being wanted.

**Pig Iron.**—The almost universal reply to an inquiry in regard to the condition of business is that there is no business doing. A further inquiry in regard to prices is that as there is no business there is no change in prices; what little Iron may be needed is taken at quoted rates and the quantity would not be increased even if prices were reduced. This defines the entire situation, and to say anything beyond that is largely a speculation on probabilities. Under the circumstances, however, everybody is doing more or less guessing, and it is only natural that they should do so. The general impression in regard to Pig Iron is that prices must go lower; some think 50c. to \$1 per ton is all the decline that ought to be expected; others are unwilling to fix a limit, but evidently believe that it will be more than \$1 per ton before absolutely rock bottom is reached. If the experience of former years is a safe guide, it is not improbable that the majority of people fail to grasp the extreme gravity of the situation. The upward movement always reaches a higher level than any one expects when it gets its first start, and by the same rule the decline runs much beyond the estimates made at the beginning. It is true, however, that conditions are not exactly parallel with what they were during the former periods of reaction and depression. Furnace owners are stronger financially, and the disposition to co-operate for mutual protection was never as great as it is at the present time; consequently when it is clear that business can only be done at a loss, restrictive operations are applied immediately. It may be, therefore, that prices will not show much of a decline, but to insure that there must be a great curtailment in production. There appears to be no diversity of opinion in regard to that. Whatever the demand may be during the last quarter of the year, it is abso-

lutely certain that during the third quarter it will be the smallest there has been for years, so that the extent of any decline which may come is a matter of uncertainty. Meanwhile, there is very little confidence in present quotations, although they are not materially different to those of last week. The tendency is toward lower figures, however, and there are more sellers at \$14.50 for No. 2 X Foundry, delivered, than there are sales at \$15, the bulk of the business having been done at \$14.60 to \$14.85 for good brands of Northern Iron. Mill Irons are also somewhat easier, and Basic is also readily available at about \$13.50. The general range for Philadelphia and nearby deliveries would be about as follows:

|                                   |                    |
|-----------------------------------|--------------------|
| No. 1 X Foundry.....              | \$15.25 to \$15.50 |
| No. 2 X Foundry.....              | 14.50 to 15.00     |
| No. 2 Plain.....                  | 14.00 to 14.25     |
| Alabama No. 2, rail shipment..... | 13.50 to 13.75     |
| Alabama No. 2 on dock.....        | 12.50 to 12.75     |
| Standard Gray Forge.....          | 13.25 to 13.50     |
| Ordinary Gray Forge.....          | 12.75 to 13.00     |
| Basic.....                        | 13.25 to 13.50     |

**Steel.**—There is no change in the Steel situation. There is a good demand for small lots for prompt shipment, and sales are readily made at about \$24, delivered, but there is not much demand for extended deliveries.

**Plates.**—There is not much demand for Plates, although some districts make a tolerably fair showing, the South particularly. The contract for five large ferry boats has been secured by the Maryland Steel Company and some other small work has been taken by the Delaware shipyards, but it cannot be said that the outlook is encouraging as regards the immediate future. Prices are unchanged, although Light Plates are said to be taken by mills outside the pool at something less than the official prices, which remain as follows:

|  | Carloads.<br>Cents. | Part<br>carloads.<br>Cents. |
|--|---------------------|-----------------------------|
| Tank Steel, ¼-inch and heavier.....  | 1.73½               | 1.78½                       |
| Tank Steel, 3-16-inch.....   | 1.83½               | 1.88½                       |
| Tank Steel, Nos. 7 and 8, B. W. G.....   | 1.88½               | 1.93½                       |
| Tank Steel, Nos. 9 and 10, B. W. G.....  | 1.98½               | 2.03½                       |
| Flange or Boiler Steel.....  | 1.83½               | 1.88½                       |
| Commercial Fire Box Steel.....   | 1.93½               | 1.98½                       |
| Still Bottom Steel.....  | 2.03½               | 2.08½                       |
| Locomotive Fire Box Steel.....   | 2.23½               | 2.28½                       |
| Plates over 100 to 110 inches.....   | .05 per lb. extra   |                             |
| Plates over 110 to 115 inches.....   | .10                 |                             |
| Plates over 115 to 120 inches.....   | .15                 |                             |
| Plates over 120 to 125 inches.....   | .25                 |                             |
| Plates over 125 to 130 inches.....   | .50                 |                             |
| Plates over 130 inches.....  | 1.00                |                             |
| All sketches (excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches)..... | .10                 |                             |
| Complete Circles.....  | .20                 |                             |
| Shell grade of Steel abandoned.  |                     |                             |

**Structural Material.**—A small hand to mouth business is all that can be reported in this department, and for the next few weeks it is hardly likely that there will be much improvement. Prices remain as last quoted—viz.: Beams, Channels and Angles, 1.73½c. to 1.85c., according to specifications, and small Angles, 1.50c. to 1.55c.

**Bars.**—Business is extremely dull and there is no disposition to buy for extended deliveries. There should be a better demand in anticipation of the holidays, as the suspension of work may be more protracted than usual and it is usual to stock up a little to tide over the holiday period. Prices are unchanged, but there is an impression that they cannot be maintained much longer unless the demand improves; consequently there is no disposition to buy beyond covering immediate requirements. Sales of both Iron and Steel Bars at 1.48½c. to 1.52½c., according to quantity and quality.

**Sheets.**—There is quite a good demand for Sheets and mills are fully employed on quick deliveries. There is a disposition to take good sized lots when concessions can be obtained, but the best Sheets are firmly held, so that, while prices are low, they are steady and not likely to suffer further decline.

**Old Material.**—The demand has not improved and the tendency is still toward lower prices. Sales are made at about the prices quoted below, bids and offers for deliveries in buyers' yards being about as follows:

|  |                    |
|--|--------------------|
| No. 1 Steel Scrap.....                 | \$11.25 to \$11.50 |
| Low Phosphorus Scrap.....              | 15.00 to 16.00     |
| Old Steel Axles.....                   | 15.00 to 16.00     |
| Old Iron Rails.....                    | 14.50 to 15.00     |
| Old Iron Axles.....                    | 16.50 to 17.00     |
| Old Car Wheels.....                    | 11.00 to 11.50     |
| Choice Scrap, B. R. No. 1 Wrought..... | 12.75 to 13.25     |
| Yard Scrap.....                        | 11.50 to 12.00     |
| Machinery Scrap.....                   | 11.00 to 12.00     |
| No. 2 Forge Fire Scrap.....            | 9.50 to 10.00      |
| No. 2 Forge Fire Scrap (Ordinary)..... | 8.00 to 8.50       |
| Wrought Turnings.....                  | 8.00 to 8.50       |
| Axle Turnings, Choice Heavy.....       | 9.00 to 9.50       |
| Cast Borings.....                      | 6.25 to 6.50       |
| Stove Plate.....                       | 9.00 to 9.50       |
| Wrought Iron Pipe.....                 | 9.50 to 10.50      |

E. M. McIlvain, president of the Bethlehem Steel Company, South Bethlehem, Pa., is ill with fever, contracted during a recent trip to Cuba.

## Pittsburgh.

PARK BUILDING, June 22, 1904.—(By Telegraph.)

**Pig Iron.**—Some stir has been created in the Pig Iron market the past week by the heavy tonnage placed by the Standard Sanitary Mfg. Company for their Louisville, New Brighton and Allegheny works. This business amounted to about 9500 tons, 3700 tons of which was Southern Nos. 2 and 3 and Southern Forge for the Louisville works, 1700 tons of Northern Nos. 2 and 3 Foundry and Northern Forge for the New Brighton Works, and about 4000 tons of Northern Nos. 2 and 3 Foundry and Northern Forge for the Allegheny Works. The Southern No. 2 Foundry was placed at about \$9, the No. 3 \$8.50 and the Forge \$8, all f.o.b. Birmingham. The Northern No. 2 was placed at about \$11.75, Valley, or \$12.60, Pittsburgh, and the Northern Forge at about \$12.15, Pittsburgh. The entire 9500 tons have been placed, and deliveries are to commence at once. There is little doing in Bessemer or Basic Iron, but we note a sale of 1000 tons of Basic at a price slightly under \$12.50, Pittsburgh. We quote Bessemer and Basic Iron at \$11.85 to \$11.75, Valley, or \$12.50 to \$12.60, Pittsburgh. We note, however, that some Valley furnaces are holding Bessemer and Basic at \$12, at furnace, and refuse to go any lower. We quote Northern No. 2 Foundry at \$11.75, Valley, or \$12.60, Pittsburgh, but on a firm offer and for large tonnage this price might be slightly shaded. Northern Forge is held at \$12.15 to \$12.25, Pittsburgh.

**Steel.**—There is very little doing in the Steel market, but there are reports of sales of Billets and Sheet and Tin Bars at considerably under official prices. The Billet meeting next month is awaited with a good deal of interest, but it is not known now whether prices will be lowered. It is the general impression that some change will have to be made.

(By Mail.)

As yet there is very little that is encouraging to be noted in the condition of the Iron trade, which continues very quiet and does not promise to become more active for some little time yet. Some in the trade believe that after the Presidential nominations there may be a revival in trade, and while this may come, it will probably be only of a temporary nature. The year is now about half over and it is too late to take up large enterprises other than to do the preliminary work for them and carry them out next year. This applies particularly to large building projects and to extensions by railroads. The latter continue to confine purchases to actual needs, and some of the larger systems, notably the Pennsylvania, are cutting down expenses in every direction. One of the leading officials of the Pennsylvania Railroad has stated that he cannot tell when the scaling down process will stop, but he sees no reason to be hopeful of the immediate future. He goes further and states that additional reductions of the force of employees must be made to the extent of at least 5000. The fact that the railroads are buying in a very limited way explains to some extent the light tonnage being placed in Iron and Steel of all kinds, but in addition the uncertainty as to prices of Billets, Rails, Plates and Structural Steel for the last half of the year is also having its effect. A meeting of the Billet and Rail Association will be held in New York early in July, but it is not believed there will be any change in the price of Rails. As regards Billets the situation is not so clear. Any reduction made in the official price of Billets would mean a corresponding cut in prices of Plates, Structural Steel and Steel Bars, which are controlled by agreements. The Billet market is so narrow that the tonnage of Billets sold at official prices really cuts little figure. It is doubtful if 10 per cent. of the product of the Steel mills is sold at official prices, as nearly all consumers are covered by sliding scale contracts. There are very few buyers of Billets, but quite a number of independent Sheet and Tin Plate mills buy Bars in the open market. It is doubtful, too, whether a reduction in price of Billets, Plates and Structural Steel would help the demand any, but, on the contrary, it might add to the uncertainty and cause buyers to hold off still longer in the belief that prices would go lower. If the present market can be held until September or thereabouts it is believed there will be a material increase in tonnage. To make any reduction in prices now would not help the market, so far as increasing tonnage is concerned. Little concern is felt over the failure to adjust the Puddling, Bar Iron and Hoop scales at the conference held last week. An agreement exists between the Amalgamated Association, Republic Iron & Steel Company and American Steel Hoop Company that in the failure to adjust the scale before June 30 the mills are to continue in operation. Orders are not pressing, and if the scale is not arranged it is probable that a good many mills will close to make needed repairs and take stock. There is no pressure on the mills to get out orders and it is a very opportune time to shut down. A conference is now in session in this city between the Amalgamated Association, the American Sheet & Tin Plate Company and a number of the outside Sheet and Tin Plate mills



for the purpose of adjusting the Sheet and Tin Plate scales. It is doubtful if a settlement will be reached at the first conference, as the mills want a reduction of about 18 per cent., while the Amalgamated Association offers only 10 per cent.

Prices of Pig Iron seem to have gone lower, and Standard Bessemer is being offered as low as \$11.65, Valley furnace, or \$12.50, Pittsburgh. Basic Iron is also offered at about the same prices, while Northern Forge is very close to \$12, Pittsburgh. The Standard Sanitary Mfg. Company came into the market last week for upward of 10,000 tons of Foundry and Forge Iron, and have closed for a part of this, about 3500 tons, for shipment to their Louisville works. This was Southern Iron, No. 2 going at \$9, the No. 3 at \$8.50 and the Forge at \$8, f.o.b. Birmingham. The company expect to close to-day (Tuesday) for the balance, and we understand have been quoted some relatively low prices for the Northern Foundry and Forge. A number of blast furnaces in the two Valleys will run for the next month or more to work up stocks of Ore, and will then close down unless there is an improvement in demand for Pig Iron in the meantime. The blast furnace of the Ohio Iron & Steel Company, at Lowellville, will close about July 1, and Ella, at West Middlesex, will go out this week. Pig Iron is being piled pretty rapidly, and a heavy restriction in output is imperative.

**Ferromanganese.**—There is very little doing, and we quote English and domestic Ferro at \$41.50 to \$42, delivered.

**Muck Bar.**—The market continues quiet, and best grades of domestic Muck Bar are held at about \$24, Pittsburgh. With the lower prices ruling for Forge Iron, our quotation on Muck Bar might be shaded on a firm offer.

**Wire Rods.**—The market is quiet, and prices of Rods have gone off to some extent. Bessemer and Open Hearth Rods are held nominally at \$29, Pittsburgh, but on a firm offer this could be shaded.

**Skelp.**—Some heavy sales of Sheared Steel Skelp are reported on the basis of about 1.35c., Pittsburgh, or perhaps a trifle lower. We quote Grooved Iron Skelp at 1.42½c. to 1.45c.; Sheared, 1.47½c. to 1.50c., and Grooved and Sheared Steel Skelp at 1.35c., Pittsburgh.

**Steel Rails.**—A report was current here last week that the 20,000 tons of Rails placed by the Southern Pacific for delivery at Galveston, Texas, was taken by an Eastern mill at \$21 at mill. It is hardly necessary to deny this report, as no such low price was made. No large contracts have been placed recently, aside from the above, but a good many small orders have been placed. One prominent Rail mill official places the probable Rail business this year at 2,000,000 tons, which is about 75 per cent. of last year's business. We quote at \$28, at mill, for Standard Sections, while Light Rails are held at \$21 to \$25, at mill, depending on weight.

**Structural Steel.**—No large business has been placed in the past week, but a good deal of tonnage is in sight. Among this is the Steel for the Duquesne Way elevated tracks, about 10,000 tons, which will be placed by Pennsylvania Railroad officials at Philadelphia before long, as bids on this work have already been asked. This tonnage is practically certain to be placed with Pittsburgh mills. A 14-story office building at Columbus, Ohio, will be placed next week, while the Wabash extension will be given out this week and will probably go to the American Bridge Company. The extension to Carnegie Institute, in this city, which will take 6000 to 8000 tons, will go to the Carnegie Steel Company. A good many small orders are being placed and a great deal of work, especially in the East, which has been held up on account of labor and tightness in the money market, is expected to come out this year yet. Some low prices are being made on small Angles by outside mills. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

**Plates.**—There is no improvement in demand for Plates, and all the mills are short of work. A good deal of tonnage is being held back pending result of the Plate meeting next month, and a better demand in July is confidently expected, whether there is any change in prices or not. We quote: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, A. B., M. A., and ordinary Fire Box, 1.80c.; Still Bottom, 1.90c.; Locomotive Fire Box, not less than 2.10c., and up to 3c.; Plates over 100 inches to 110 inches in width, not less than 5c. per 100 lbs. extra; Plates over 110 inches to 115 inches wide, not less than 10c. extra; Plates over 120 inches to 125 inches wide, not less than 25c. extra; Plates over 125 inches to 130 inches wide, not less than 50c. extra; Plates over 130 inches wide, not less than \$1 extra; Plates 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. Above prices are on carload lots, f.o.b. at mill, Pittsburgh, with 5c. extra for less than carload lots; terms, net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

**Sheets.**—A conference is now on in the Frick Building, in this city, between the Sheet mills and the Amalgamated

Association, to arrange the Sheet scale. It is not likely, however, that the scale will be settled at the first meeting, as the manufacturers want a reduction of 20 per cent. over last year's scale, while the Amalgamated offers only 10 per cent. Demand for Sheets is quiet, and prices are not very firm. A number of the leading mills will close early in July for inventory and repairs. We quote Black Sheets, box annealed, one pass through cold rolls, as follows: No. 26, 2c.; No. 27, 2.05c.; No. 28, 2.15c. On desirable orders these prices would be shaded about \$1 a ton. Galvanized Sheets are selling at about 80 and 7½ per cent. off. In net prices this discount figures out as follows: Nos. 22 and 24, Galvanized Sheets, 2.59c.; Nos. 25 and 26, 2.77c.; No. 27, 2.96c., and No. 28, 3.14c. All above prices are for carloads and larger lots, jobbers charging the usual advances for small lots from store.

**Iron and Steel Bars.**—The Bar trade continues rather quiet, and this is probably largely due to the fact that most of the leading consumers were given an opportunity to cover their requirements several months ago before the price was advanced. Specifications on contracts are coming in fairly well, but new tonnage being placed is altogether for small lots and for actual needs. We quote Iron Bars at 1.30c. to 1.35c., Pittsburgh. Official prices on Steel Bars are being maintained by mills in the agreement, but are possibly shaded by a few of the outside mills. We quote Steel Bars at 1.35c., Pittsburgh, in carloads and larger lots, with the usual differential for less than carloads. On Open Hearth Bars \$1 a ton advance is charged.

**Railroad Spikes.**—The market is rather quiet, the railroads placing very few new orders. Tonnage is mostly in small lots and for actual needs. We quote at \$1.60 per 100 lbs., f.o.b. Pittsburgh.

**Hoops and Bands.**—We quote Hoops at 1.55c. and Steel Bands at 1.35c., extras per Steel card. Demand for both Hoops and Bands is rather quiet.

**Merchant Pipe.**—The gas line for Kansas, referred to in this report recently, has not yet all been placed, but a part of the tonnage, about 25,000 feet of 16-inch, has been given to a Western mill. A meeting of the independent Pipe mills was held here yesterday to investigate the reports of cutting in prices by several mills. The reports were found to be exaggerated. On Merchant sizes of Steel Pipe there is some cutting in prices. The mills are not getting as much tonnage as they would like, and when a good order comes on the market there is a good deal of competition for it and prices are shaded. Consumers' discounts in carload lots, which are shaded more or less, are as follows:

|   | Steel.    |           | Iron.     |           |
|---|-----------|-----------|-----------|-----------|
|   | Black.    | Galv.     | Black.    | Galv.     |
|   | Per cent. | Per cent. | Per cent. | Per cent. |
| ¼, ½ and ¾ inch.....                                | 69        | 59        | 66        | 56        |
| 1 inch.....   | 72        | 62        | 69        | 59        |
| 2 to 6 inches.....                                  | 76        | 66        | 73        | 63        |
| 7 to 12 inches.....                                 | 71        | 61        | 68        | 58        |
| Extra strong, plain ends, ½ to 8 inches.....        | 68        | 58        | 64        | 54        |
| Double extra strong, plain ends, ½ to 8 inches..... | 60        | 50        | 56        | 46        |

**Boiler Tubes.**—There is a good deal of competition among the mills for tonnage in Tubes, and prices are being materially shaded. It is said that in some cases orders for Tubes have been taken at less than cost. Consumers' discounts in carloads, which are being considerably shaded, are as follows:

|                      | Steel. | Iron. |
|----------------------|--------|-------|
| 1 to 1½ inches.....  | 42½    | 39    |
| 1½ to 2½ inches..... | 55½    | 38    |
| 2½ inches.....       | 58     | 43    |
| 2½ to 5 inches.....  | 64½    | 50½   |
| 6 to 13 inches.....  | 55½    | 38    |

**Merchant Steel.**—Demand continues dull and the mills are very short of work. Shipments this month will show a large falling off, as compared with May. The Snaffing Association met in Cleveland last week and reaffirmed prices. We quote: Plow Slabs, ¾ inch and heavier, 1.60c.; Tire Steel, 1.55c. to 1.60c.; Sleigh Shoe, flat, 1.40c. to 1.45c.; Cutter Shoes, 2.05c. to 2.10c.; Plow Steel, 6 inches and under, 1.35c.; Toe Calk Steel, 1.85c. to 1.90c.; Crucible Tool Steel, 6c. to 8c. for ordinary grades, and 12c. and upward for special grades. Shafting is 52 per cent. off in carloads and 47 per cent. in less than carloads, delivered.

**Spelter.**—Demand is light, being mostly for carload lots, as none of the large consumers are in the market. We quote prime grades of Western Spelter at 4.75c., Pittsburgh, for spot shipment. Prices in the last few days have firmed up a little.

**Tin Plate.**—Most of the business in Tin Plate for this year has been placed, and the mills are running full on specifications. Current demand continues good, and where a Tin Plate mill is in position to take an order and ship out promptly a premium of 5c. to 10c. a box can be secured. We quote 100-lb. Cokes at \$3.40 per box, Pittsburgh.

**Iron and Steel Scrap.**—The Scrap market is practically lifeless, and not enough tonnage is being sold to establish prices. We therefore omit quotations.

**Coke.**—Output of Coke last week in the Upper and Lower Connellsville regions fell below 200,000 tons, the first time this has occurred in some months. In the past ten days more than 1500 ovens have been put out of blast, owing to dull demand for Coke. The Frick Coke Company have a total of 10,857 ovens, of which 8237 were active last week and 2620 idle. All the other Coke concerns have more or less ovens out of blast. Strictly Connellsville Furnace Coke has declined squarely to \$1.45 a ton, with reports that \$1.40 has been done. Outside makes of Furnace Coke not so high in quality as Connellsville are being offered at \$1.25 to \$1.35 a ton. Connellsville 72-hour Foundry Coke is selling at \$1.90 to \$2 a ton to consumers.

## Cleveland.

CLEVELAND, OHIO, June 21, 1904.

**Iron Ore.**—The masters and pilots acknowledged defeat in their fight with vessel owners, and returned to work last week. The boats are now running, but they have very little work to do. The sales of Ore have been very light, no general covering movement having started as yet among the furnace owners. As to the rates on the transportation of Ore, it is now generally understood that the wild rates will be 70c. from the head of the lakes to Ohio ports and 55c. from Escanaba to Lake Erie docks. The rates for the movement of contract material have not been made, and it is hardly likely there will be any commitments before the last of this week or the first of next. The market has seemingly settled on the prices recently quoted—namely, \$3.25 for Bessemer Old Range, \$3 for Bessemer Mesaba, \$2.85 for non-Bessemer Old Range and \$2.75 for non-Bessemer Mesaba.

**Pig Iron.**—The small covering movement among the foundrymen and the dullness prevalent generally in the Pig Iron trade have brought about talk of a shutting down of the blast furnaces in this territory during July and August. It is said that many owners taking individual action will close their furnaces for those months, and that a considerable percentage of the productive capacity will thus be idle before very long. The only buying which has been done has been purely hand to mouth, and prices have not been strong. Reports of cuts to \$12 in the Valleys for No. 2 have been persistent, but without any definite developments. The general quotations range about \$12.25 to \$12.50 in the Valleys. There is still a fair call for Malleable, coming largely from the agricultural implement works. The Bessemer and Basic trades are dull. The market has lacked even inquiries. The prices which would be quoted now from this territory would be entirely nominal. The Coke conditions have not changed, the market being easy. Good 72-hour Foundry Coke is bringing \$2 to \$2.25, while High Sulphur Cokes range about \$1.75. The best Furnace Coke is bringing about \$1.60. We quote Pig Iron prices as follows, f.o.b. Cleveland:

|   |            |         |
|---|------------|---------|
| Northern Coke, No. 1 Foundry.....       | \$13.50 to | \$13.75 |
| Northern Coke, No. 2 Foundry.....       | 13.00 to   | 13.25   |
| Northern Coke, No. 3 Foundry.....       | 12.50 to   | 12.75   |
| Southern Coke, No. 1 Foundry.....       | 13.60 to   | 13.85   |
| Southern Coke, No. 2 Foundry.....       | 13.10 to   | 13.35   |
| Southern Coke, No. 1 Soft.....          | 13.60 to   | 13.85   |
| Southern Coke, No. 2 Soft.....          | 13.10 to   | 13.35   |
| Jackson County, 8 per cent. Silicon.... | 16.45      |         |
| Hanging Rock Charcoal, No. 1.....       | 23.45      |         |
| Southern Charcoal, No. 1.....           | 17.85      |         |
| Lake Superior Charcoal.....             | 16.50 to   | 17.00   |

**Finished Iron and Steel.**—Regardless of untoward conditions seeming to prevail in raw and semifinished materials, the Cleveland market has shown a decided improvement in some lines of the Finished Steel trade. The conspicuous features of strength have been Hoops and Bands, Shapes and Plates. The other trades are dull, bordering on stagnation, from which no inducement as to prices seems able to lift the laggard market. The improvement in Bands has been noticeable and the situation is strong. The mills are holding for 1.50c. to 1.55c., Cleveland, and have been getting the price. The strength of the situation seems to arise from a belated buying movement. There is likewise some improvement in the Structural trade, due to the buying to cover current needs incidental to the increased speed in building operations. The lots bought have not been large, but the current orders are good and specifications against old contracts show a tendency to improve. Prices have held steady at 1.60c., Pittsburgh. The better buying in Plates is encouraging, as that has been one of the backward features in this market. The price holds even with recent quotations. The Sheet trade continues weak. Prices out of stock only show stability, while the prices in car lots at the mill indicate growing weakness in the trade. The buying movement has eased of late. The best price now is 2.10c., at the mill, for car lots of No. 27 Black Sheet, as a base, but that could be shaded by a good order. Stock quotations are based on 2.50c. for No. 27. The Rail and Billet trades show no change either as to conditions or price. The Bar situation is easier, since Bar Iron mills are so soon to close. Bar Steel holds steady at the old list of prices, very little being done.

**Old Material.**—The market has not been on the mend to any appreciable extent. Prices have held firm for the

time being, their downward course having been checked because the dealers are tired of making sacrifices. The closing of the Bar Iron mills is shutting off much of the demand and the market is far from active. Prices are continued, as follows, all gross tons: Old Steel Rails, \$12; Old Car Wheels, \$12; Heavy Melting Steel, \$11. All net tons: Cast Borings, \$4 to \$4.50; No. 1 Busheling, \$10 to \$11; No. 1 Railroad Wrought, \$11.50 to \$12; Wrought Turnings, \$6 to \$6.50; Iron Car Axles, \$16 to \$17; No. 1 Cast, \$10.50 to \$11; Stove Plate, \$8 to \$8.50.

## Birmingham.

BIRMINGHAM, ALA., June 20, 1904.

Opinion as to the market outlook for Iron is varied. Conclusions are influenced by the point of view from which one regards them. Compared with the condition of affairs last week, there has been an improvement in the market tone, but there has as yet been no improvement in values. Iron cannot be bought at the minimum prices quoted by interested outsiders. Every effort was made during the past week by important buyers to obtain concessions in prices without avail. Advances were frequent that others were offering at the prices bid, but preference was given in this instance with the expectation of prompt acceptance. In some instances agents anticipated the acceptance of orders at minimum prices and sent them in with the assurance that the sales were necessary to hold the trade. One of these orders was for 1000 tons covering in delivery up to September, and the price sale was \$9 basis for No. 2 Foundry. Those orders were declined with thanks and notification served that no orders below \$9.50 would be accepted. There were other orders on the same basis promptly declined. From buying markets came the assurance that offerings on the basis of \$9 for No. 2 were free, and the same report was in circulation here. Your correspondent made every effort to ascertain the correctness of the report and failed to substantiate it. The interest credited with selling at the reported minimum price, when asked as to its correctness, stated most positively that there was no foundation for it.

Your correspondent saw a number of recorded sales at the basis of \$9.50 for No. 2 Foundry and also a number on the basis of \$9.25, but he saw none on the basis of even \$9. There were numbers of orders on the minimum basis, and if all had been accepted our furnace yards would have been cleaned up. A leading interest said: "We have had a better inquiry this week than for a long time, and from across the sea it is just as good as the home demand. If we could get the ocean room we could place with quick dispatch 30,000 to 40,000 tons on export orders." This same interest report that the aggregate of their inquiries for the last half of the week was fully 60,000 tons. They say also that there were numbers of cases of important buyers ordering round lots on the basis of \$9 for No. 2 Foundry, which they declined in every instance, replying invariably that they had but one price and that was basis \$9.50 for No. 2 Foundry.

For No. 3 Foundry convincing papers were submitted showing that sales were being made at \$9. Some of it went at \$8.75, which is on the basis of \$9.25 for No. 2 Foundry. Some Gray Forge was placed at \$8.50, but nothing below that was reported. There are some interests who report a very quiet time in the market, the increased inquiry reported by others not having reached them. Some interests have sold their limit up to August and announce that for a while they are out of the market.

As to the stock on hand, it is estimated by some at 125,000 tons, while others put it at about 100,000 tons. Take either estimate as being the correct one, and it can readily be seen that a moderate demand would speedily exhaust it.

Some export orders were worked during the week, say, 1500 tons. The business was limited by the difficulty of obtaining ocean room. This difficulty will not be lessened until foreign vessels are turned toward our ports for cotton. Ship brokers have been sedulously bombarded with inquiries for room without succeeding in getting any of moment. The export price is reported as being full up to the price the domestic trade is paying.

The Rolling Mill of the Republic Company here, as well as that of the Tennessee Company at Bessemer, is being overhauled and put in condition for operations. It is reported they will resume operations on July 1.

To-day is the day set by the miners' convention for a meeting with the Coal operators. The latter have held no meeting, and the association has practically died of inanition. The operators who may attend the meeting will do so without authority to bind any one besides themselves by their action. Each interest will act as seems best for its individual advantage. There will be a contention as to the wage scale. That happens every year. The operators seem to be indifferent about any action that may be taken. If either side feels much interest in the proceedings they are successfully concealing it.

The Pittsburgh Coal & Coke Company have purchased from the Southern Railway Company the Coal tippie at Greenville, on the Mississippi River, and all their equipment



for the movement of Coal down the river, including the barge lines, towboats, &c. The purchase price is given at \$100,000. The purchasing company some time ago acquired large interests in Coal properties in Walker County, and this last purchase gives them the practical control of the markets for Coal in that territory.

Some New York parties, headed by John Boehling, have purchased the Brown Ore properties contiguous to Fort Payne on the Alabama & Great Southern Railroad, and will develop them as rapidly as possible. The Ores have been tested to their satisfaction, and the railroad is building a spur to reach the Ore beds. The output has been engaged.

The Pipe works are yet full of business, and one interest at Bessemer has received a rush order to forward 325 cars of Pipe as soon as possible to St. Louis. This is supplemented by another order to forward 40 cars to Beaumont, Texas.

There is a continuance of improvements, concerning which mention has heretofore been made. There is some dickering going on concerning important properties that promises successful conclusion. Affairs are gradually becoming more optimistic.

## Cincinnati.

FIFTH AND MAIN STS., June 22, 1904.—(By Telegraph.)

**Pig Iron.**—The week just ended shows the market to be in a very quiet and unsatisfactory state; \$9 now appears to be the open basis for No. 2, although some furnaces are still unwilling to go below \$9.25. Southern furnaces, however, as a rule are understood to be offering at \$9, Birmingham, any brand of No. 2 Foundry which they produce, and as they apparently come in for their share of any tonnage that may offer, this fact is self-evident. There is no chance in the North except for a further decline in the Pittsburgh district, where buying in good volume has caused sharp competition in both Northern and Southern Foundry and Forge Iron. Ohio furnaces are working hard to maintain a basis of \$12 for No. 2 Foundry, and we can learn of nothing being sold at a less figure. No improvement is to be noted in the foundry or mill trades, and all lines are very quiet. New work is slow in developing and many foundries cannot see one day's melt ahead. They expect conditions to improve by August 1, but nothing like a gain in business is expected prior to this. We understand that the recent order of the National Tube Company was placed on basis of \$7.65, Birmingham, for Southern Forge, while not one ton of No. 2 Foundry was sold to the Sanitary Mfg. Company at above \$9. This latter mentioned concern, we learn, purchased 1400 tons of No. 2 Soft, 500 tons of No. 2 Foundry, 500 tons of No. 3 Foundry, 1200 tons of Gray Forge and 400 tons of Silvery, the balance of the 10,000 tons being Northern and Virginia. Quite a number of small orders have been placed during the week. The Highland Iron & Steel Company, Terre Haute, 500 tons; the Indiana Stove Works, Evansville, 300 tons; the Wehrle Company, Newark, Ohio, 2300 tons, on all of which business the basis is reported to have been \$9 or less, the lower price, however, being made only on Analysis Iron. The United States Cast Iron Pipe & Foundry Company hold their annual meeting in New York this week, and as their inquiry is for anywhere from 10,000 to 50,000 tons, it is believed this business will locate the bottom figure. Freight rates from Hanging Rock district to Cincinnati, \$1.15, and from Birmingham, \$2.75. We quote, f.o.b. Cincinnati, as follows:

|                                |            |         |
|--------------------------------|------------|---------|
| Southern Coke, No. 1.....      | \$12.25 to | \$12.50 |
| Southern Coke, No. 2.....      | 11.75 to   | 12.00   |
| Southern Coke, No. 3.....      | 11.25 to   | 11.50   |
| Southern Coke, No. 4.....      | 11.00 to   | 11.25   |
| Southern Coke, No. 1 Soft..... | 12.25 to   | 12.50   |
| Southern Coke, No. 2 Soft..... | 11.75 to   | 12.00   |
| Southern Coke, Gray Forge..... | 10.75 to   | 11.00   |
| Southern Coke, Mottled.....    | 10.50 to   | 10.75   |
| Ohio Silvery, No. 1.....       | 15.65 to   | 16.15   |
| Lake Superior Coke, No. 1..... | 13.15 to   | 13.65   |
| Lake Superior Coke, No. 2..... | 12.65 to   | 13.15   |
| Lake Superior Coke, No. 3..... | 12.15 to   | 12.65   |

### Car Wheel and Malleable Irons.

|                                       |            |         |
|---------------------------------------|------------|---------|
| Standard Southern Car Wheel.....      | \$16.25 to | \$16.75 |
| Lake Superior Car Wheel and Malleable | 15.80 to   | 16.30   |

**Coke.**—The best that can be said for Coke is that there is no market and little or no interest is shown. The market price for best brands of Connellsville Coke is from \$1.75 to \$2 at oven.

**Plates and Bars.**—The past week has shown somewhat better inquiry, and there is a growing demand for this class of material. We quote, f.o.b. Cincinnati, as follows: Iron Bars, in carload lots, 1.40c., with half extras; the same in smaller lots, 1.70c., with full extras; Steel Bars, in carload lots, 1.48c., with half extras; the same in smaller lots, 1.80c., with full extras; Base Angles, 1.73c., in carload lots; Beams and Channels, in carload lots, 1.73c.; Plates, ¼-inch and heavier, 1.73c., in carload lots; in smaller lots, 2c.; Sheets, 16-gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; 14-gauge, in carload lots, 1.95c.; in smaller lots, 2.50c.; Steel Tire, ¾ x 3-16 and heavier, 1.68c., in carload lots.

**Old Material.**—There is very little demand in this line and the market is sluggish to the extreme. We quote dealers'

prices, f.o.b. Cincinnati, as follows: No. 1 Railroad Wrought Scrap, \$11 to \$11.50 per net ton; No. 1 Cast Scrap, \$9.25 per net ton; Iron Rails, \$14.50 per gross ton; Steel Rails, rolling mill lengths, \$11 to \$11.50 per gross ton; Iron Axles, \$15 per net ton; Car Wheels, \$11 to \$11.50 per gross ton; Heavy Melting Scrap, \$11.50 per gross ton; Low Phosphorus Scrap, \$11.50 to \$12 per gross ton.

## The Belgian Iron Market.

BRUSSELS, June 1, 1904.

The conclusion of an understanding between our eight large Steel works has produced a favorable impression in the whole industrial world, if it were only for the reason that it is possible to defend more effectively through its intervention the interest of the Belgian Steel industry in the discussion of an international understanding growing out of the initiative of Germany. Without a doubt the Belgian Steel Syndicate will have the most favorable results for the concerns belonging to it and affiliated with it. But it is a question whether it will be advantageous for the industry at large and taken as a whole. The future only can answer this question, which will depend above everything else upon the policy followed by the syndicate. Its object must be, above all, to regulate production so as to keep it in harmony with the demand. This should lead to a stiffening in prices, which should apply more particularly to the finished products, but should apply only in a lesser degree to the intermediate products, so as to enable the rolling mills proper to profit from the new conditions since it is necessary to guard all interests. Meetings among our Steel men are increasing in number. To-day there will be a reunion at Brussels, in which examination will be made of the features affecting the policy to be pursued, and at which the by-laws will be discussed. While we must wait until the syndicate has been formally established in a legal sense, attention is directed to the carrying out of an understanding with the German Steel Syndicate and with the French Steel works who are engaged in export. Later on there will be taken up the relations of these associations with those existing in England and in the United States. As will be seen the metallurgical industries of Europe are hugging vast and complicated projects which offer a good many difficulties on account of the multiplicity and the diversity of interests involved. Although here people are generally very skeptical as to the chances of a successful issue, particularly so far as the United States is concerned, they are not inclined to set aside entirely all possibility of success. As it is, the rail mills of Germany, Belgium and England, have met at Brussels on May 27 in order to reach an international understanding as to the sales of rails. It is not yet certain what will be the outcome of these meetings, but the general opinion is that an understanding will be very quickly reached, particularly since a combination of this character has already existed a number of years ago and went through its trials.

So far as business is concerned, the impression produced upon the general situation by the conclusion of the arrangements between our eight Steel works has been a very happy one. Buyers who until the last moment had doubted the possibility of such a concentration were forced to surrender to facts, and fearing a rise in prices placed with our rolling mills orders which they had long withheld in expectation of a decline. Germany, who has been quoting higher prices for export orders, has become a less serious competitor in the world's markets. The result of all this has been that during the whole of May work has been on a very satisfactory scale.

In the Pig Iron market quietness has again become the dominating feature. The Belgian syndicate having decided to give prices another lift of 50 centimes from October 1, the Lorraine Luxemburg makers have seized the occasion to sell in Belgium about 20,000 tons of mill Iron for delivery during the third quarter at advantageous conditions. The blast furnaces of the Longwy district in France have also sold under favorable conditions for the buyers 18,000 to 20,000 tons to our rolling mills for delivery from July to December. Until the Belgian syndicate has closed an arrangement with the Longwy and the Lorraine Luxemburg syndicates, its power must necessarily be limited. The first negotiations with the latter syndicate have not, unfortunately, led to any result, the parties having been unable to reach an understanding on the question of quantities. Belgian mill Iron is actually fetching 51.50 francs at Athus, equivalent to 55.50 francs, delivered, Charleroi. Foundry Iron is holding up at 59 francs on cars Belgian Luxemburg. Basic Bessemer is still selling at 62 marks.

The market for Steel and Muck Bar, which was very active, has again become quiet. The small rolling mills during the negotiations for the Steel Syndicate rapidly covered their requirements. Since the tonnage available in Belgium was very limited, and since the works of German Lorraine had raised prices, these rolling mills applied to the French works, where they secured everything they required. For this reason the Steel works of Micheville and the Longwy Steel works have not a ton available. Since the consuming mills are now covered for quite a long time ahead the transactions have become very limited. Prices

have not changed, but show a pronounced tendency toward an advance. Muck Bars are scarce at 90 to 92.50 francs.

Old Material is still very firm and prices have risen about 1 franc per ton. The ordinary quality required by the rolling mills is to-day fetching 68.50 marks, in place of 67.50 marks a month ago.

So far as rolling mill products are concerned they have not changed very much, as will be seen from the following list of prices:

|                                   | Home market. | Export. |
|-----------------------------------|--------------|---------|
|                                   | Francs.      | £ s.    |
| Beams .....                       | 122.50       | 4 6     |
| Steel Angles .....                | 132.50       | 5 0     |
| Rails, 50 kg. and upward .....    | 115.00       | 4 6     |
| Rails, 15-30 kg. ....             | 120.00       | 4 12    |
| Rails, under 15 kg. ....          | 130.00       | 4 16    |
| No. 2 Iron Bars .....             | 135.00       | 5 0     |
| Merchant Steel Bars .....         | 135.00       | 5 0     |
| No. 2 Iron Plate .....            | 140.00       | 5 9     |
| No. 2 Basic Bessemer Plates ..... | 140.00       | 5 9     |
| No. 2 Open Hearth Plates .....    | 155.00       | 6 0     |
| Steel Rods .....                  | 145.00       | 5 10    |

Let it be noted that the price of £5 made for No. 2 Iron Bars, f.o.b. Antwerp, has been only maintained with difficulty. It is the result of the fact that the Société des Forges de St. Eloi, at Thy-le-Chateau, a new company, has been forced to take business at very low prices in order to gain a footing. Steel Bars are undoubtedly in a better position. The same is true of Rails, for which there has been quite a demand. In Beams there is considerable activity for the home markets, as building has been in good shape this year. Pretty good orders are also secured for export. While the Sheet mills are still pretty well favored with orders, the Plate mills do not seem to be able to secure any advantage from the recovery which has been noticeable lately in naval construction. All the mills are running, but they are all suffering from low prices.

## New York.

NEW YORK, June 22, 1904.

**Pig Iron.**—Only a moderate tonnage is being placed and the market is very quiet. There are quite a number of export inquiries, but the prospects of any great tonnage are not bright, because it is clearly intimated that Middlesbrough will follow any downward lead and because freights will work upward rapidly if much Iron is contracted for. At present our domestic prices are from 2 to 3 shillings above parity, delivered at Bremen or Manchester. The only change thus far is for Mediterranean ports. We continue to quote for Northern brands, at tidewater, \$14.75 to \$15 for No. 1 Foundry, \$13.75 to \$14.25 for No. 2 Foundry, and \$12.75 to \$13 for Gray Forge. Tennessee and Alabama brands are quoted \$12.75 to \$13.25 for No. 2 Foundry and \$12.25 to \$12.75 for No. 3 Foundry.

**Steel Rails.**—There are reports that orders aggregating 30,000 tons have been placed since the Harriman and Hill interests purchased the quantities referred to in our last. No details are given. We continue to quote \$28 for Standard Sections, freights equalized, and \$21 to \$24 for Light Sections, at mill, according to weight.

**Cast Iron Pipe.**—Contracts were placed last week by the Department of Water Supply of the City of New York at very low prices. One contract, which is to be delivered in 100 days, calls for 620 net tons of 6 to 36 inch Pipe and 490 tons of specials. The price named for the Pipe was \$23.45, and for the specials \$54. The second contract, which is to be delivered in 200 days, calls for 1120 net tons of 4 to 24 inch pipe and 420 tons of specials. The figures named for the Pipe was \$22.75, and for the specials \$47. The deliveries are all to be made in the local yards of the department. Both contracts were awarded to a firm of Pipe brokers. The name of the foundry which will furnish the Pipe and specials has not been disclosed. The Perth Amboy contract alluded to in last week's report was taken by a contractor, who has placed a portion of it with a New Jersey company. The general demand for Pipe is very slow at present. Only small lots are now coming up. Municipalities and others who contemplate improvements requiring Pipe are experiencing much difficulty in marketing bonds, which accounts in a great measure for the small amount of work now coming out. The high pressure fire service scheme in this city is probably making some progress, but no announcement has been made as to the time when bids will be received for the Pipe required. Quotations on carloads are still \$28 per gross ton for 6 to 10 inch, and \$27 for 12-inch upward, at tidewater, but anything like a desirable order can be placed at somewhat lower figures.

**Finished Iron and Steel.**—Some improvement is reported in the Structural line, but it is confined to building purposes. Bridge work is still quiet. The railroad companies are doing nothing. The contracts for Structural Material recently placed have not been notable as to tonnage, but are more numerous. The improvement in this respect is distributed quite generally throughout the country. Prices for fabricated work are low, and a greater inducement to build is thus offered. It had been expected that the

city of New York would award to one of the local shipyards a portion of the contract for five new ferry boats for the Staten Island ferry route, for which bids were opened last week. The entire lot was, however, awarded to the Maryland Steel Company. The contract will amount to more than \$1,000,000, and, as previously stated, will require about 2500 tons of Steel for the hulls and boilers. Some hope is entertained in the local Plate trade that one of the boats will be built by a local shipyard under subcontract. The general demand for plates is still quiet, as the local shipyards and boiler works are doing comparatively little. Bar Iron manufacturers report a fair volume of business. The orders now received come from all classes of consumers, but run smaller in quantity than under usual conditions. A change from the hand to mouth character of buying is not expected until some time during the latter part of summer. Meanwhile the mills generally will either close down for repairs or run light on account of the hot weather, and the output will be restricted. Bar Iron prices were reaffirmed at a meeting of the manufacturers in this city last Thursday. We quote, at tidewater, as follows: Beams, Channels, Angles and Zees, 1.74½c. to 2c.; Tees, 1.79½c. to 2c.; Bulb Angles and Deck Beams, 1.84½c. to 2.05c. Sheared Plates in carload lots are 1.74½c. to 1.85c. for Tank, 1.84½c. to 2c. for Flange, 1.94½c. to 2.10c. for Marine and 1.94½c. to 2.50c. for Fire Box, according to specifications. Refined Bar Iron, 1.44½c. to 1.49½c.; Soft Steel Bars, 1.49½c.

**Old Material.**—The lull in the Old Material market continues. Inquiries have almost disappeared. Accumulations are large and offerings are consequently quite heavy, but consumers are not disposed to make purchases unless they can secure pronounced bargains. Inquiries for Steel Scrap for export are in the market, but buyers' views are too low to lead to business. It is stated that \$10 per gross ton is offered, but the material must be of certain lengths and sizes, requiring higher cost for the careful selection necessary. Quotations per gross ton, New York and vicinity, are as follows:

|                                     |                    |
|-------------------------------------|--------------------|
| Old Iron Rails .....                | \$14.00 to \$14.50 |
| Old Steel Rails, long lengths ..... | 12.00 to 12.50     |
| Old Steel Rails, short pieces ..... | 10.00 to 10.50     |
| Relaying Rails .....                | 16.00 to 17.00     |
| Old Car Wheels .....                | 10.00 to 11.00     |
| Old Iron Car Axles .....            | 15.50 to 16.00     |
| Old Steel Car Axles .....           | 14.00 to 14.50     |
| Heavy Melting Steel Scrap .....     | 10.00 to 10.50     |
| No. 1 Railroad Wrought Scrap .....  | 11.50 to 12.00     |
| Iron Track Scrap .....              | 10.50 to 11.00     |
| Wrought Pipe .....                  | 7.50 to 8.00       |
| Ordinary Light Iron .....           | 6.50 to 7.00       |
| Cast Borings .....                  | 3.50 to 4.00       |
| Wrought Turnings .....              | 5.50 to 6.00       |
| No. 1 Machinery Cast .....          | 9.00 to 10.00      |
| Stove Plate .....                   | 8.00 to 8.50       |

## Metal Market.

NEW YORK, June 22, 1904.

**Pig Tin.**—The selling on the part of Chinese producers in the Far East, to which we have previously alluded during the last few weeks, continues on a heavy scale, and as a result prices are still on the downward trend. During the last week the drop in prices has been much sharper than any noted so far in this movement, both in this market and in London. There is no confidence whatever in the article either here or abroad. In this country business in a consuming way is very slow, and little interest is taken in the speculation which is in progress abroad. The arrivals this week have not been quite as heavy as was expected, but the metal is *en route*, and it is generally believed that within the next few days a sufficient quantity will arrive to swell the figure for the month to unusually large proportions. At the close to-day the prevailing figure was 25.50c. to 25.75c. for spot, June and July deliveries. The London market cabled spot at £116 17s. 6d. and futures £116 7s. 6d. It will be noted that these figures are almost £3 below last week's cables.

**Copper.**—The market is absolutely without change here, as is also the general situation. Nothing of interest is to be reported, and while the rather heavy buying for export has continued, the business for home consumption is still exceedingly small. Prices are as follows: Lake, 12.62½c. to 12.75c.; Electrolytic, 12.40c. to 12.62½c.; Casting, 12.12½c. to 12.25c. The London market has advanced a shade to £56 7s. 6d. for spot and £56 5s. for futures. Best Selected has advanced £1, to £60 5s. So far this month 9369 tons were exported.

**Pig Lead.**—There is no change. The market is very dull and uninteresting. The American Smelting & Refining Company still quote 4.20c. for Desilverized in 50-ton lots, shipment within 30 days. The spot price quoted here by outside concerns is 4.20c. to 4.30c. St. Louis is unchanged at 4.10c., and London shows a slight advance to £11 10s.

**Spelter.**—The market is in a rather dull condition and prices are unchanged at 4.75c. to 4.87½c. for spot. St. Louis still quotes 4.60c., and the London market is slightly higher at £21 17s. 6d. Business is very slow.



**Antimony.**—The market is unchanged. Hallett and Cookson's are both quoted at 7.25c., and other brands are unchanged at 6.25c.

**Nickel.**—The usual amount of business is passing and prices are firm, large lots being quoted at 40c. to 45c. and smaller quantities at 50c. to 60c.

**Quicksilver.**—The market is quiet, with ample stocks and a demand of moderate proportions. Flasks of 76½ lbs. are quoted at \$45. The London price has declined to £8.

**Tin Plate.**—The market is unchanged, with a fair demand reported. Quotations are very firm, on the basis of \$3.45 per box for 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to \$3.64, New York. The Welsh market has declined 3 pence, to 11 shillings 3 pence, f.o.b. Swansea.

## The New York Machinery Market.

NEW YORK, June 21, 1904.

S. Pearson & Son, Limited, of London, who have the contract for building the East River section of the Pennsylvania Railroad's New York tunnel, have gotten down to their work in real earnest and are now putting the matters into shape which will prove of great interest to the machinery trade. Offices have been opened at 128 Broadway. Another set of offices will doubtless be secured shortly in Long Island City near the shaft of the tunnel. A large corps of the company's draftsmen and engineers are now in this country busily engaged in getting the drawings and specifications in readiness for an early commencement of the work. The specifications for the machinery are now being prepared as rapidly as possible, some of the items having already been decided upon as to their capacity, &c. Plans for the two power stations to be used in the construction of the tunnel have been practically completed. One is to be located at each end of the tunnel. They will each be of about 2500 boiler horse-power. They will contain large units of air compressors, engines, generators and pumps. Bids on this apparatus will shortly be received and purchases will doubtless be made before any other materials are obtained.

A good deal of interest is shown in the announcement last week to the effect that the stockholders of the Norfolk & Western Railway had authorized the issuance of \$35,000 gold 40-year bonds, the proceeds of which are to be devoted to the completion of double tracking work and general improvements. It has been known in the trade that the Norfolk & Western Railway Company proposed extending their shop systems considerably, and the announcement of the new bond issue leads to the assumption that this work will commence within a short time. Charles Churchill, the chief engineer, with offices at Roanoke, Va., advises us, however, that matters have not progressed sufficiently to make any detailed statement in this respect at this time.

An important announcement is made by the Engineering Company of America, 74 Broadway, New York, who have heretofore been engaged in purely professional work. It is now announced that the company will engage in the general engineering, construction and contracting business in addition to their former line. A number of large projects are now being put through by the company, covering electric railroad construction, water works, power houses, refrigerating plants, &c. Specifications for mechanical equipment for these plants are now in course of preparation, and within a short time extensive purchases will be made along this line. Bids for some of this material are, in fact, being submitted at the present by various subcontractors and machinery houses. P. M. Mowrey, the vice-president of the company, is attending to these matters. The company have branch offices in Chicago, Denver, Charlotte, N. C., and Birmingham, Ala.

During the last few years the Gleason Works of Rochester, N. Y., who are very well known in the machinery trade through their double gear planer, have extended their present plant considerably, and it is now found that the limit of their buildings has been reached. The first move toward building an entirely new plant has just been made through the purchase of a tract of land 20 acres in size. It is located adjacent to the front yards of the New York Central & Hudson River Railroad in Rochester, and affords excellent facilities for the transportation of raw materials and the finished product. While preliminary plans have been prepared and a general idea has been formed of the style of the new plant, the various details have not as yet been fully determined upon. The plant, of course, will be of thoroughly modern construction and equipment, and will be of sufficient capacity to allow for a considerable increase in production.

The Niagara Falls Machine & Foundry Company, Limited, Niagara Falls, Canada, have just increased their capital stock to \$50,000 for the purpose of increasing their plant. The company manufacture hoisting engines, forgings and general contractors' plant equipment. They also do general machine work, and produce gray iron and brass castings. They are also preparing to manufacture cast iron pipe fittings for the Canadian market, and intend erecting a brass

furnace. The plant will be remodeled, allowing for the use of electrical power for the operation of the machinery. They are now in the market for brass furnaces, small drop hammers and boring mills, and are seeking catalogues pertaining to these articles. S. H. Brownlee is general manager of the company.

The Niagara Falls Metal Stamping Company, who have recently succeeded the Metal Stamping Company, Niagara Falls, N. Y., intend erecting a new plant within a short time into which the equipment of their present plant will be moved and for which a considerable quantity of new machinery will be purchased. The machinery to be installed will include drop forging, milling, spinning, sheet metal, slotting and similar machinery, together with a number of screw machines, power, screw and drawing presses. A new power plant equipment will also be purchased. At present the company does a large variety of work in stamped and formed specialties from sheet steel, brass, tin, copper and aluminum, and also an extensive line of solid work from steel and brass rods, bars and wire. It is intended to increase the scope of production considerably, adding a number of hardware specialties.

The Susquehanna Marine Works Company have just been formed to take over the plant and business of the Susquehanna Boat Works, Havre de Grace, Md. New shops will be erected and new machinery installed in the near future. It is intended to put in a machine shop for the manufacture of gasoline engines. Steam and sailing vessels, yachts, launches and life boats will also be built. C. C. Pussey, who was proprietor of the Susquehanna Boat Works, is the president of the new company.

The Enterprise Iron Works Company, Limited, of Alexandria, La., are building a new machine shop, foundry, pattern shop and blacksmith shop. For the equipment of the new works they have purchased a number of machines which were used in the plant of the Orange Iron Works of Orange, Texas, and have ordered a Newton cupola and Root Positive pressure blower. They are in the market at the present for a 72-inch wheel lathe and a steam hammer of medium size. The company manufacture saw mill equipment, tram engines, pumps, boilers and steam boat machinery. F. R. Eddy, the secretary of the company, is sending out inquiries for new machinery. The other officers of the company are C. W. McFarlane, president; J. A. Bentley, vice-president, and C. F. Crockett, treasurer.

The National-Acme Mfg. Company, Cleveland, Ohio, have just opened offices in the St. Paul Building, 220 Broadway, New York, under the management of R. A. Scranton. The products of this company include the Acme automatic multiple spindle, screw machines, the Acme semiautomatic screw slotters and all sorts of work milled from bar or rod, including cap, set and special screws.

The following bids were opened at the Bureau of Supplies and Accounts, Navy Department, Washington, on June 14, for machine tools for the Eastern navy yards:

- Bidder 1. Bertsch & Co., Cambridge City, Ind.
2. The Allington & Curtis Mfg. Company, Saginaw, Mich.
3. Sterling Blower & Pipe Mfg. Company, New York.
4. The Fosdick Machine Tool Company, Cincinnati, Ohio, informal.
5. Henry R. Worthington, New York.
6. Edward W. Irwin, New York.
7. The Albrow-Clem Elevator Company, Philadelphia.
8. The Otis Elevator Company, New York.
9. The Marine Engine & Machine Company, New York.
10. Baltimore Machine & Elevator Works, Baltimore, Md.
11. New Jersey Foundry & Machine Company, New York.
12. Babcock & Wilcox Company, New York.
13. The Falkenau-Sinclair Machine Company, Philadelphia, Pa.
14. Montgomery & Co., New York.
15. Springfield Machine Tool Company, Springfield, Ohio.
16. The Cleveland Punch & Shear Works Company, Cleveland, Ohio.
17. Manning, Maxwell & Moore, New York.
18. The Fairbanks Company, New York.
19. The Sterling Company, Chicago, Ill.
20. Hill, Clarke & Co., Boston, Mass.
21. The Fox Machine Company, Grand Rapids, Mich.
22. The H. B. Smith Machine Company, Smithville, N. J.
23. The Walter H. Foster Company, New York.
24. American Steam Pump Company, Battle Creek, Mich., informal.
25. Fitchburg Machine Company, Fitchburg, Mass.
26. Berlin Machine Works, Beloit, Wis.
27. The Alliance Machine Company, Alliance, Ohio.
28. The American Machinery Company, Grand Rapids, Mich.
29. George Place, New York.
30. Bement, Miles & Co., Philadelphia, Pa.
31. Potter & Johnston Machine Company, Pawtucket, R. I.

32. The Brown & Sharpe Mfg. Company, Providence, R. I.

33. H. A. Rogers, New York.

34. The Ajax Mfg. Company, Cleveland, Ohio.

35. The Bentel & Margedant Company, Hamilton, Ohio.

36. The Morgan Engineering Company, Alliance, Ohio.

37. S. A. Woods Machine Company, South Boston, Mass.

38. I. H. Johnson, Jr., Company, Philadelphia, Pa.

39. Lawrence Machine Company, Lawrence, Mass.

40. The Cleveland Crane & Car Company, Wickliffe, O.

41. Pawling & Harnischfeger, Milwaukee, Wis.

42. Buffalo Forge Company, Buffalo, N. Y.

43. Niles-Bement-Pond Company, New York.

44. The Heine Safety Boiler Company, St. Louis, Mo.

45. Eastern Sheet Steel Works, New York.

46. Prentiss Tool & Supply Company, New York.

47. Wm. M. Graham, Philadelphia.

48. Motley Green & Co., New York.

49. Drew Machinery Agency, Manchester, N. H.

50. Erie Foundry Company, Erie, Pa.

51. Williams, White & Co., Moline, Ill.

52. Cuyler & Mohler, Baltimore, Md.

53. Aultman & Taylor Machinery Company, New York.

54. Pratt & Whitney Company, Hartford, Conn.

55. The American Tool Works Company, Cincinnati, O.

56. Industrial Works, Bay City, Mich.

57. The J. R. Van Dyck Company, New York.

58. Smith-Courtney Company, Richmond, Va.

59. John D. Westbrook, Norfolk, Va.

60. The Garvin Machine Company, New York.

61. Hilles & Jones Company, Wilmington, Del.

Class 1. One 36-inch triple geared engine lathe—Bidder 6, \$1425; 15, \$1620; 17, \$2600, \$1800 and \$1950; 18, \$1624; 23, \$1548; 25, \$1550; 38, \$1557; 43, \$1670; 46, \$1645; 57, \$1779; 61, \$1460.

Class 2. One 18-inch engine lathe—Bidder 15, \$420; 17, \$534, \$595 and \$500; 18, \$400 and \$449; 23, \$505; 43, \$520; 46, \$520; 55, \$538; 57, \$483; 61, \$446.

Class 3. One engine lathe—Bidder 17, \$616; 18, \$585 and \$599; 20, \$547.40; 43, \$530; 46, \$748; 55, \$610; 57, \$607; 61, \$567.

Class 4. One engine lathe—Bidder 17, \$424; 46, \$674; 54, \$520.

Class 5. One engine lathe—Bidder 17, \$454; 54, \$912 and \$773.

Class 6. One standard pattern engine lathe—Bidder 17, \$555 and \$334; 18, \$375; 43, \$375 and \$250; 46, \$424; 54, \$455 and \$615; 57, \$316; 61, \$400.

Class 7. One engine lathe—Bidder 17, \$887; 18, \$624 and \$539; 20, \$585.80; 43, \$600; 46, \$749; 57, \$617.

Class 8. One engine lathe—Bidder 17, \$866; 18, \$698; 20, \$666; 43, \$695; 46, \$754; 57, \$678.

Class 9. One cutting off lathe—Bidder 17, \$675; 20, \$617 and \$602; 43, \$595; 46, \$595; 49, \$535.

Class 10. One automatic lathe—Bidder 37, \$450; 49, \$437.

Class 11. One motor driven pipe cutting and threading machine—Bidder 6, \$879; 17, \$850; 18, \$328; 20, \$830 and \$851; 43, \$685; 49, \$688; 58, \$717.20; 59, \$655.54.

Class 12. One pipe threading and cutting machine—Bidder 6, \$719; 14, \$805; 17, \$790; 20, \$659; 23, \$255; 43, \$843; 49, \$833; 58, \$867.

Class 13. Three 4-inch pipe machines—Bidder 2, \$2637; 14, \$2901; 17, \$950; 20, \$2715 and \$3135; 23, \$1365; 43, \$2520; 49, \$2145 and \$2920.50; 52, \$2910; 58, \$3081.

Class 14. One rivet machine—Bidder 18, \$2031; 34, \$2040; 43, \$2695; 49, \$1730, \$2195 and \$2270; 51, \$2300.

Class 15. One No. 4 single punching and shearing machine—Bidder 1, \$939; 13, \$526; 16, \$840, \$1000, \$1225 and \$1575; 17, \$986; 18, \$560; 27, \$1080; 30, \$709; 43, \$760; 49, \$815; 51, \$625; 57, \$590.

Class 16. One No. 3 turret head bolt cutting machine—Bidder 23, \$352; 43, \$250.

Class 17. One carving and molding machine—Bidder 17, \$450; 29, \$425; 49, \$361.

Class 18. One tenoning machine—Bidder 17, \$200; 18, \$159; 22, \$198; 29, \$224; 35, \$200; 49, \$157, \$190 and \$207; 58, \$251.60.

Class 19. One improved band saw machine—Bidder 17, \$325; 18, \$187; 21, \$170; 28, \$242; 29, \$249; 35, \$160; 37, \$329.50; 49, \$168.

Class 20. One improved quick acting jig or scroll saw—Bidder 17, \$75; 18, \$63.25; 29, \$84; 35, \$77; 37, \$70; 49, \$68 and \$85.

Class 21. One power hack saw—Bidder 20, \$18.50; 49, \$24; 52, \$30; 61, \$20.

Class 22. One power feed railway cut off saw complete—Bidder 17, \$198.50; 29, \$198; 35, \$175; 37, \$195.40.

Class 23. One heavy automatic railway cut off saw complete—Bidder 17, \$494.00; 29, \$374; 37, \$490.

Class 24. One automatic circular saw sharpener—Bidder 37, \$228; 49, \$235.

Class 25. One patent band sawing machine—Bidder 17, \$295; 18, \$108; 21, \$157; 22, \$135; 28, \$244; 29, \$259; 35, \$160; 37, \$320; 49, \$163; 58, \$149.18.

Class 26. One new automatic band saw filing and setting machine—Bidder 29, \$60; 58, \$59.

Class 27. One double revolving rip and cross cut saw—Bidder 28, \$747.35; 29, \$570; 37, \$637.58; 43, \$445 and \$405.

Class 28. One slate sawing machine—Bidder 43, \$790.

Class 29. One 300-ton wheel press—Bidder 17, \$1735; 18, \$1649; 27, \$1285; 33, \$1560; 43, \$1390; 46, \$1695; 49, \$1720.

Class 30. One automatic wire straightening and cutting machine—Bidder 17, \$385; 46, \$391; 49, \$297; 57, \$356.

Class 31. One 4½-inch cutting machine—Bidder 17, \$475; 18, \$368 and \$485; 49, \$338.50; 54, \$682; 61, \$500.

Class 32. One automatic gear cutting machine—Bidder 17, \$3800.

Class 33. Two combined shaping, edging, surfacing, molding and carving machines—Bidder 17, \$1100; 29, \$1058; 43, \$1066; 49, \$1040.

Class 34. One improved surface sanding machine—Bidder 29, \$121; 37, \$117.50; 49, \$113.

Class 35. One single punching machine—Bidder 1, \$915; 16, \$915 and \$750; 17, \$1145; 18, \$1053; 27, \$1050; 30, \$799, \$849 and \$979; 43, \$898; 49, \$800, \$857 and \$1042; 51, \$700 and \$800; 57, \$900.

Class 36. One thread milling machine—Bidder 50, \$836.35; 54, \$961.

Class 37. Two stanchion pipe benders—Bidder 33, \$397; 49, \$445.

Class 38. One set heavy bending rolls—Bidder 16, \$10,925; 27, \$15,855; 36, \$15,985; 43, \$17,500; 49, \$18,300; 60, \$17,750; 62, \$13,380 and \$13,735.

Class 39. One heavy double planer and matcher—Bidder 17, \$2400; 26, \$2050; 29, \$2749; 37, \$2390.05.

Class 40. One heavy combined buzz planer with side jointer attachment—Bidder 17, \$616; 29, \$594; 37, \$612.30.

Class 41. 124-inch crank planer—Bidder 21, \$615; 30, \$1223 and \$1408; 47, \$1080.

Class 42. One universal wet or dry grinding machine—Bidder 20, \$600; 32, \$631; 43, \$640; 57, \$576.

Class 43. One automatic knife grinder—Bidder 17, \$284; 26, \$240; 37, \$280; 49, \$126.

Class 44. One No. 2 universal surface grinder—Bidder 17, \$550; 32, \$303.75; 43, \$539; 49, \$588.

Class 45. One No. 1 universal cutter and reamer grinder—Bidder 17, \$345; 18, \$214; 32, \$227; 43, \$383; 49, \$372; 57, \$374.

Class 46. One grinding machine—Bidder 17, \$525; 32, \$683.

Class 47. One knife grinding machine—Bidder 17, \$300; 26, \$275; 29, \$229; 37, \$315; 49, \$141.40.

Class 48. One grinding machine—Bidder 23, \$655; 32, \$673.

Class 49. Two electrically driven sensitive drills—Bidder 18, \$200; 43, \$200.

Class 50. Two upright drills with motor drive—Bidder 18, \$438; 43, \$600.

Class 51. One improved friction drill—Bidder 20, \$229.

Class 52. One 3-inch radial drilling machine—Bidder 17, \$445 and \$528; 18, \$597; 43, \$560; 49, \$540; 55, \$542; 57, \$485.

Class 53. One 14-inch crank pillar shaper—Bidder 6, \$214; 15, \$225; 17, \$250; 18, \$236; 21, \$32; 23, \$385; 31, \$349; 43, \$382; 55, \$280; 61, \$230.

Class 54. One combined crank shaper—Bidder 6, \$424 and \$479; 17, \$500; 18, \$447; 21, \$612; 23, \$520; 31, \$556; 43, \$463; 55, \$490.

Class 55. One 10-ton revolving crane for installation on pontoon for floating repair shop—Bidder 27, \$8813; 40, \$5750; 41, \$9850; 56, \$7250.

Class 56. Two electrically driven centrifugal pumps and spare parts—Bidder 5, \$1089.95; 39, \$1149.80; 42, \$673.30; 48, \$909.80.

Class 57. For furnishing and installing four 350 horse-power wrought steel sectional boilers—Bidder 12, \$23,783 and \$21,211; 19, \$21,522; 44, \$26,275; 53, \$24,830.

Class 58. One electric elevator—Bidder 7, \$3171; 8, \$3100; 9, \$4353; 10, \$2739; 11, \$3550.

Class 59. For installing three dust collecting systems in building No. 7 and two dust collecting systems in building No. 11—Bidder 2, \$7800; 3, \$5689; 45, \$9364.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until July 9 for furnishing and installing two 750-kw. steam turbo generator units at the Boston Navy Yard.

The Canadian Rand Drill Company, Sherbrooke, Quebec, have just closed with the Canadian Westinghouse Company of Hamilton, Ontario, for the installation of a Rand-Corliss compound power driven air compressor, to be installed in their new plant. This machine is designed to furnish air for the various pneumatic appliances throughout the works and is to be driven by a Westinghouse motor through a Morse chain drive. The International Coal & Coke Company, Coleman, Alberta, have just placed an order with the Canadian Rand Drill Company, Sherbrooke, Quebec, for a 300 horse-power steam driven Rand duplex compressor of the very latest type.



# HARDWARE.

THE trade are only too familiar with the eminently unsatisfactory condition of things in connection with the sale of Builders' Hardware. The jobbers and the manufacturers are too frequently serving customers of whom the retailers should take care. The fact, however, that the leading manufacturers in this line are working together in a degree of harmony which contrasts strikingly with the state of things which prevailed a relatively short time ago gives ground for the hope that there may be a modification of established methods which will be to the advantage of the retail merchants, to whom the sale and distribution of this class of goods legitimately belong. The old excuse for direct dealings—that there was no possibility of adhering to an agreed policy—cannot now be advanced by the manufacturers, for with the present conditions under which this line is made and marketed any arrangement that might be made by and between the manufacturers could be successfully carried out. If, in the future, the retail dealers are not left to control the local trade, it must be because they have not the ability to handle it or the manufacturers do not want them to do so.

The sale of Builders' Hardware is, however, a business unto itself, requiring special treatment along rules not applicable to other portions of the Hardwareman's stock. It requires a separate department, under men trained in the technicalities involved in its sale and use, and they are by no means the clerks to whom the lowest wages are paid. With the possible exception of Fine Cutlery and some classes of housefurnishings, there is probably scarcely a branch of the Hardware line which, under favorable circumstances, would pay a better profit, and if the merchant were allowed to possess his field with no competition except that of his fellows, he could, in many towns and cities, afford to equip a Builders' Hardware department, hire good men to conduct it and make it a feature of his business. If, however, he must see the cream of the trade taken by the manufacturers and the jobbers, and the over-the-counter dealings and cheap dwelling contracts left to him, he is illy repaid for the labor and expense of selling the goods and carrying the accounts.

In the present juncture it therefore behooves the retail merchants to see to it that they are prepared to take care of this class of business intelligently and successfully. This will require a knowledge, which not every Hardware merchant possesses, of an intricate and complicated department of trade, with adequate arrangements for a display of the samples and supply of the goods either from stock or, as would frequently be the case, on order from the manufacturers. The fact that so many merchants are not in a position thus to carry on the business satisfactorily is one of the reasons given by the manufacturers for going direct to the contractors. If the retail merchants are thus able and willing to solicit and take care of orders for Builders' Hardware, it is obviously the duty and the interest of the manufacturers and jobbers to leave the business to them, and not to attempt to supply the goods themselves. Some of the requirements for such efficient service on the part of the retailer and some of the obligations which rest on the manufacturer and jobber are referred to in a communication on a following page. While laying down some admirable principles, the difficulty of the problem is, at the same time, indicated in our correspondent's remarks.

## Condition of Trade.

The consensus of opinion in trade circles among both manufacturers and merchants seems to be that, although business shows a reduction in volume compared with last year, there is yet a healthy demand for goods. A cardinal factor in the situation is the crop prospect, which so far is good. For some time dealers have been ordering very conservatively, and there is no accumulation of stocks, and while it is said that in some cases orders have been canceled, owing to the receipt of lower quotations, it is agreed that prices are fairly firm. No immediate change is looked for during the summer and a satisfactory business is anticipated for the fall. While it is true Presidential campaigns occupy the time of many men, there is a general agreement that they are becoming more and more a sentimental quantity, after all. Hardware in general has had a period of unusual activity for the last three or four years. Now there is a disposition to husband resources and watch the tendency of the market. Many manufacturers feel that there is no reason for complaint so far, some of them being still occupied in filling orders long on their books, and in many instances are, for the first time in several years, so situated as really to want new orders. The opinion is expressed that prices on staple goods in leading lines will not materially decline during the remainder of the year, although advances are not anticipated. In the cheaper grades of Hardware, requiring only plain castings, and in goods of simple character, where unskilled labor and material are most important, there may be some reduction in price, contingent on the market for raw material. In exports, business to Great Britain appears to be extremely quiet, to Continental Europe and Australasia fair, and to Mexico moderate—in the latter instance chiefly on account of greatly increased importations in the last few months, to anticipate the present higher tariff there.

### Chicago.

The most interesting commodity in the Western market at the present time is Nails. While the leading producer and such independents as are following them are nominally adhering to the schedule of prices which have been printed from week to week, it is a matter of fact that the man who is actually buying Nails in any quantity is securing them at much lower prices. Contracts are being entered into by both the leading producer and independents on the basis of \$1.95, Chicago, for lots aggregating 1000 kegs or more for Bright Wire Nails, and there is no difficulty to secure a price of \$2 per keg, base, for car lots. Cut Nails are also extremely weak in price, \$1.65 to \$1.70, Pittsburgh, or \$1.81½ to \$1.86½, Chicago, being the ruling price for either Iron or Steel Cut Nails in carload lots, with the higher prices sometimes offered for lots aggregating less than carloads. The fight between the manufacturers of Coated Nails, owing to the expiration of certain patents, has reduced the price of that specialty to about \$1.55, Chicago, the price of \$1.50 having been made and withdrawn by one maker. Jobbers are holding Wire Nails pretty firmly at \$2.15, base, Chicago, for small lots, and \$2.10, base, for round lots, while they are selling the Cut Nails on the basis of about \$2 per keg, Chicago. Barbed Wire and Smooth Fence Wire seem to share the weakness of the Wire Nail. Leading manufacturers of Builders' Hardware have decided to reaffirm published prices on all lines, including the lines upon which competition is severe, with the understanding that competitive prices will be met whenever necessary, almost regardless of the cut necessary to secure the business. Manufacturers of Screen Cloth are receding from their former position of refusing to extend contracts at \$1.10, Chicago, and are now offering to take on new business at that price. On the other hand, such jobbers as have a stock of Screen Cloth are holding prices at from \$1.25 to \$1.35 from stock, as they recognize the fact that orders placed now at the mills

are likely to be delivered too late for the present season's demand. This commodity has suffered as a result of the unprecedented cold spring, the sales being at least a month behind those of ordinary years. The past week has been rather better than usual in Hardware lines, and every breath of warm air fans the business into greater activity.

### NOTES ON PRICES.

**Wire Nails.**—The quietness in the trade is slightly more pronounced as the month advances. It is understood that a second conference among officers of the largest interest is to be held, at which the question of prices will be a prominent one among the topics to be considered. A former conference resulted in prices remaining unchanged. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

|  |        |
|--|--------|
| Jobbers, carload lots.....             | \$1.90 |
| Retailers, carload lots.....           | 1.95   |
| Retailers, less than carload lots..... | 2.05   |

**New York.**—The call for small lots from store is referred to as satisfactory for the season. Comparing sales, they are up to or ahead of those of last year, but at that time local building operations were practically paralyzed. Quotations are as follows: Single carloads, \$2.10; small lots from store, \$2.20.

**Chicago, by Telegraph.**—Wire Nails are nominally quoted by the leading producer at the following prices, f.o.b. Chicago: Jobbers, carload lots, \$2.05; retailers, car lots, \$2.10; retailers, less than car lots, \$2.20, though these prices are being shaded by independents and met when necessary. Coated Nails are still quoted at \$1.55 to \$1.60 per keg to dealers or large consumers, delivered, Chicago.

**Pittsburgh.**—With possibly one or two exceptions, the leading Wire mills have about finished filling contracts and are now actively seeking new business in Wire Nails, which, however, is very light. A number of mills of the leading Wire Nail interest, and also several of the outside mills, will close down for two weeks or longer early in July for repairs and stock taking. The impression prevails that a reduction in price may be made before long. Prices on the whole are being firmly maintained and are shaded slightly only to a few extreme Southern and Western points. We quote Wire Nails, \$1.90 in carloads to jobbers, \$1.95 in carloads to retailers, and \$2 to \$2.05 in small lots to retailers, all f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days, plus actual freight to point of delivery.

**Cut Nails.**—A meeting of the Cut Nail Association is scheduled for the 23d inst., too late for any report of the results to be given in this issue of *The Iron Age*. The market has been more or less irregular a portion of this month, with rumors of weakness, caused by concerns outside the association offering concessions in prices. Regular quotations are as follows for Steel and Iron Nails, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

|                                    |        |
|------------------------------------|--------|
|                                    | Base.  |
| Jobbers, carload lots.....         | \$1.75 |
| Jobbers, less than carloads.....   | 1.80   |
| Retailers, less than carloads..... | 1.90   |

**New York.**—The demand is somewhat light in this locality, but a certain amount of business is being transacted. Locally, jobbers' stocks appear poorly assorted, owing to the inability of getting shipment promptly from mill. Regular quotations are as follows: Carloads on dock, \$1.89½; less than carloads on dock, \$1.97½; small lots from store, \$2.05.

**Chicago, by Telegraph.**—Mills are selling freely on the basis of \$1.65 to \$1.70, Pittsburgh, or \$1.81½ to \$1.86½, Chicago, the higher price being made to consumers and the lower to jobbers as a general thing, although lines are not drawn sharply between the two classes.

**Pittsburgh.**—The new demand is light and not much improvement is expected until about August. One of the leading mills withdrew from the Cut Nail Association some time since. Prices are only fairly firm, and to some points of delivery, especially in the South and West, are slightly shaded. We quote Steel and Iron Cut

Nails at \$1.75, base, in carload lots, and \$1.80 in less than carloads, f.o.b. mill, terms 60 days, less 2 per cent. off in 10 days.

**Barb Wire.**—The demand is light, and so many rumors of such action are in circulation that an official reduction in prices would not come as a surprise to the trade at large. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

|  |          |        |
|--|----------|--------|
|  | Painted. | Galv.  |
| Jobbers, carload lots.....             | \$2.20   | \$2.50 |
| Retailers, carload lots.....           | 2.25     | 2.55   |
| Retailers, less than carload lots..... | 2.35     | 2.65   |

**Chicago, by Telegraph.**—The leading producers have at last acknowledged that they are selling on the basis of our Pittsburgh quotations, which makes the new prices, Chicago, as follows: Car lots to jobbers, Painted Wire, \$2.35; Galvanized, \$2.65. To retailers, car lots, Painted, \$2.40; Galvanized, \$2.70. Retailers, less than car lots, Painted, \$2.50; Galvanized, \$2.80. Staples to jobbers, \$2.25 for Plain; \$2.60 for Galvanized. Staples to retailers, 5 cents higher. These prices are not being maintained absolutely.

**Pittsburgh.**—Contracts have about all been filled, with possibly a few exceptions, and the mills are actively seeking new business. Prices, on the whole, are being well maintained. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

|                          |          |        |
|--------------------------|----------|--------|
|                          | Painted. | Galv.  |
| Jobbers, carloads.....   | \$2.20   | \$2.50 |
| Retailers, Carloads..... | 2.25     | 2.55   |
| Less than carloads.....  | 2.35     | 2.65   |

**Smooth Fence Wire.**—As the time approaches for mills to be closed down for inventory and the annual overhauling, business is only fair, having settled down to the usual summer quiet. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

|                          |        |
|--------------------------|--------|
| Jobbers, carloads.....   | \$1.80 |
| Retailers, carloads..... | 1.85   |
| Less than carloads.....  | 1.95   |

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

|                    |        |     |     |     |     |     |      |      |    |
|--------------------|--------|-----|-----|-----|-----|-----|------|------|----|
|                    | 6 to 9 | 10  | 11  | 12  | 12½ | 13  | 14   | 15   | 16 |
| Annealed.....Base. | \$0.05 | .10 | .15 | .25 | .35 | .45 | .55  |      |    |
| Galvanized....     | \$0.30 | .35 | .40 | .45 | .55 | .65 | 1.05 | 1.15 |    |

**Chicago, by Telegraph.**—The official prices now being made are as follows: Smooth Fence Wire, Nos. 6 to 9, \$1.95 per 100 pounds, in carload lots, to jobbers, f.o.b. Chicago; \$2 per 100 pounds to retailers, and \$2.10 in less than car lots. How much lower prices can be obtained on large desirable specifications is difficult to determine at this writing.

**Pittsburgh.**—A number of leading mills will shut down at least part of July for needed repairs and inventory. New business in Smooth Fence Wire is light, but prices are being generally well maintained. We quote as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days: Plain Wire, \$1.80, base, for Nos. 6 to 9, in carloads to jobbers, and \$1.95 to \$2 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14.

**Axes.**—The manufacturers connected with the Axe Association were in session in New York last week. An advance of 25 cents per dozen was determined upon, to go into effect July 1. At the same time action was taken with a view to diminishing the output of the factories, and it is the opinion of some that as a result there may be something of a scarcity of Axes before the year is over. The reports from the manufacturers indicated that the trade are showing a good deal of conservatism in purchasing, and it remains to be seen what the effect of this new advance in price will be. Inasmuch as the manufacturers are in complete control of the market at present, the trade are not surprised at the successive advances in price, whatever questioning there may be as to the wisdom of such advances.

**Cordage.**—The breaking up of the shipping embargo on the Great Lakes should stimulate the demand for Marine Cordage. Supplying this trade with Rope has



been in the hands of jobbers at lake points for years. General demand continues in about former volume, which is moderate. Rope is produced by the manufacturers to suit the price customers wish to pay, with the exception of the best quality of Sisal and Manila. Quotations on the basis of 7-16-inch diameter and larger are about as follows: Pure Manila, 11 to 11½ cents per pound; other grades of Manila, 10¼ to 10½ cents, according to quality; pure Sisal, 9 cents; mixed Sisal, 7½ to 7¾ cents, according to quality.

**Paris Green.**—Climatic conditions have been unfavorable for duplicate or second orders to be received by manufacturers. So far, it appears that the orders which were placed early in the season have proved sufficient for the requirements of the trade. No change has taken place regarding prices, which are as follows: The base quotation of 11 cents in Arsenic kegs or casks is general. Most manufacturers are asking the customary advances, but some are naming less than the regular advances on the smaller packages.

**Glass.**—At the meeting of the Window Glass manufacturers, held at Niagara Falls last week, 1000 pots were represented. There was little business of importance transacted. A committee composed of nine members was appointed to formulate a plan of organization and define the conditions under which it is proposed to transact business. It is probable that many manufacturers who are desirous of joining the organization desire to know exactly by what rules and regulations they will be governed after becoming members. This committee will meet the last of this month. A general meeting of manufacturers will be held on July 20 at Put-in-Bay, Ohio, at which time it is expected, by the leaders in the movement, that a permanent organization will be effected. Conditions have not shown any improvement so far as trade is concerned. Quotations by New York jobbers of 90 and 20 per cent. discount are reported, and from Philadelphia jobbers of 90 and 25 per cent. discount. These quotations are for small lots.

**Oils.**—*Linseed Oil.*—Trade continues light and almost entirely for small lots. Quotations are as follows: City Raw, in lots of five barrels or more, 39 cents per gallon; in lots of less than five barrels, 40 cents per gallon; State and Western Raw, 37 to 38 cents per gallon. Boiled Oil, the usual 2 cents advance per gallon over Raw.

**Spirits Turpentine.**—The free movement of the new crop to market is expected to prevent an advance in prices. In fact, declines during the week have weakened prices to some extent. The local demand is fair at the following quotations in this city, according to quantity: Oil barrels, 55½ to 56 cents; machine made barrels, 56 to 56½ cents.

## AMONG THE HARDWARE TRADE.

Ballard Hardware Company have bought the business formerly conducted by the Osger Hardware Company, Ripley, O. T.

Shaw Hardware Company, Worthington, Ind., have been incorporated with a capital of \$10,000, the directors being Hempstead C. Shaw, C. N. Shaw and William B. Harrah.

W. A. Polk has bought the Hardware part of the business of the Hartshorn Hardware & Lumber Company, Hartshorn, I. T., who will continue the lumber end as heretofore.

T. G. Lancey & Co., Pittsfield, Maine, who began business in 1886, have incorporated under the style of the T. G. Lancey Company. They are dealers in Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, Paints, Sporting Goods, &c.

Martin-Dent Hardware Company, Salem, Mo., have incorporated with a capital of \$7500, fully paid. The interested parties are W. T. Martin, E. B. Martin and T. P. Dent.

## PRICE-LISTS, CIRCULARS, &c.

*Manufacturers in Hardware and related lines are requested to send us duplicate copies of catalogues, price-lists, &c., one copy for our Catalogue Department in New York and another for our London Office; and at the same time to call our attention to any new goods or additions to their line, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.*

**DOBBIE FOUNDRY & MACHINE COMPANY,** Niagara Falls, N. Y., and 42 Dey street, New York: Catalogue No. 12 of Sheave Blocks and Sheaves for Wire and Manila Rope. Wood Tackle Blocks are also listed, but they do not manufacture this line. In Wire Rope Blocks, however, they make in all capacities and of standard or special design. They have just completed an order for export for Fittings for three 40-ton derricks, which includes the necessary Sheave Blocks of this capacity. The company are also manufacturers of Steel and Wood Derricks, Hoisting Engines, Horse and Hand Power Hoists and Winches, &c.

**THE BRISTOL TRUNK HARDWARE COMPANY,** Bristol, Conn.: Trunk Bolts, Clamps, Corners, Handle Caps and Loops, Hinges, Knees, Rollers, Shoes, Tray Fixtures, &c.

**THE B. F. GOODRICH COMPANY,** Akron, Ohio: Goodrich Clincher Pneumatic Tires for vehicles. Catalogue describing Tires and method of attachment, also instructions for making repairs.

**FISH BROTHERS MFG. COMPANY,** Clinton, Iowa: Catalogue No. 9, relating to strictly high grade Farm Wagons.

**AMERICAN WIRE FENCE COMPANY,** 189 La Salle street, Chicago, Ill.: High Carbon Spring Steel, Coiled Woven Wire, Model Spring Steel Stay Fence.

**WOOD BROS. STEEL SELF FEEDER COMPANY,** Des Moines, Iowa: Steel Feeders and Engine Tenders for threshing machines.

**THE GEORGE P. CLARK COMPANY,** Windsor Locks, Conn.: Hand, Cotton, Stove, Box, Platform, Pipe and Beam Trucks; also special Trucks made to order.

**CHATTANOOGA IMPLEMENT & MFG. COMPANY,** East Chattanooga, Tenn.: Catalogues relating to Hay Presses, Pea Hullers, Mantel Grates, Shoe Lasts and Stands, Sad Irons, Fire Dogs, &c. The company are preparing to enter upon the manufacture of Disk Plows, which they will have on the market for fall trade.

**M. LANZ & SONS,** Pittsburgh, Pa.: Catalogue and price-list of Joist Hangers and Post Caps for 60 sizes of timber, which they have added to their regular line of manufactures.

**DOVER STAMPING & MFG. COMPANY,** Cambridge, Mass.: Folder showing company's factory, calling special attention to their Extra Heavy Rustless Steel Ware.

**WHITE WAGON WORKS,** Sheboygan Falls, Wis.: Combined Coasting Wagons and Sleighs, and Jo-Carts, made in a variety of styles and sizes.

**OSBORN-COLWELL COMPANY,** 46 Cliff street, New York: Climax Tempering Oil, for tempering tools made of different tempers of steel. It is stated that the Oil makes steel tough.

**SIMPLEX ELECTRIC HEATING COMPANY,** Cambridge, Mass.; Chicago office Monadnock Building: Catalogue No. 12, displacing general catalogue No. 7, Utensils for Cooking, Heating Devices, Soldering and Sad Irons, Radiators, &c.

**PIKE MFG. COMPANY,** Pike, N. H.: Catalogue and price-list, suspending all former price-lists, devoted to Scythe, Axe and Oil Stones, Oil Stone Wheels, Oil and Water Stones, Emery and Corundum Stones, Razor Hones, Rotary Razor Strop, Silver Mounted Stones, Knife Sharpeners, Saw Jointer and Skate Sharpener, Grindstones, &c.

**D. P. HARRIS,** selling agent for B. B. and Shaw Adjustable Jacks, 48 Warren street, New York: Catalogue illustrates eight styles and many sizes of Jacks, designed for use on automobiles, vehicles, machinery, cars, &c.

**THE BEST STREET LIGHT COMPANY,** Canton, Ohio: Vapor Gas Lamps for lighting halls, stores, churches, lodges, hotels, offices, residences, streets, parks, wharfs, store entrances, summer resorts, &c.

## IRON CUT NAILS.

**I**N our last issue we published a letter from a prominent Nail manufacturer, in which he made the point that there are no strictly Iron Cut Nails now on the market, as those so designated are not made, as of old, from puddled iron. A number of Cut Nail makers, however, take issue with our correspondent, and assert that Nails of this character can still be regularly obtained. As this is a subject of general interest to the trade, we give the following extracts from letters which have come to hand:

We have always been making more iron than steel Nails. We make Iron Cut Nails from puddled iron.

We are sorry to be obliged to state that the writer of the letter of June 16, as published in your paper, does not know what he is talking about. We have been making Iron Cut Nails from all pig iron puddled bars for 20 years. Half our output now are Iron Cut Nails. We guarantee them made from all pig iron puddled bars—absolutely no scrap in the bars from which the plate is made. If the writer of the letter of June 16 or any other person will come to our works (and it is not a small factory) at any time it will be seen that we do make a pure Iron Cut Nail from clean all pig iron puddled bars, and we have ready sale for all we cut. Evidently the writer of the letter of June 16 believes the Iron Nail to be much better than the Steel or the Wire Nail, and wants the public to believe they are not getting an Iron Nail, because he does not know of any factory making them. We invite him to come here and see a 22 double puddle furnace mill and Nail factory of 110 machines that has not in 20 years, and does not now, use scrap of any kind.

We have made no Steel Nails for several years, as the demand for Iron Nails has been rapidly increasing. We make only puddled iron and refined scrap Iron Nails. Most of the steel is made by the Bessemer or open hearth acid process, and when used for Nails will rust in a few years, as can be easily determined by inquiry. We have made from 75,000 to 100,000 kegs of Cut Nails annually for the past 10 years, and have had no complaints. We prepare the Iron in such a manner that it makes as perfect a Nail as can be made from steel, as can be proven by examining our product. We are getting more for Iron Nails than we could possibly get for any class of Steel Nails. We have the world for a market to buy scrap iron, and in former years have imported largely of that product, but now there is an abundance of domestic scrap, which can be bought cheaper than it can be imported.

While not seeking a newspaper controversy with your correspondent, we can only say in reply that Iron Nails are being made by us to-day. We are running a number of puddle furnaces on the best brands of gray forge pig iron, with a certain mixture of cast scrap, and substantially the whole product goes into our Iron Nails. Looking at the question from the scrap point of view, from which your correspondent appears to argue, we would leave it to more scientific decision as to whether the decarbonizing of the soft steel scrap by the processes to which he refers is sufficient to bring it under iron classification. While admitting that greater care is necessary in the manufacture of Iron than Steel Nails, the logic of time and experience has apparently proven to a large number of intelligent consumers that the Iron Nail lasts longer than Steel.

We have carefully read the article on Iron Cut Nails. The writer of the article is mistaken in at least two statements. It is a fact that there are still a number of Cut Nail mills which make Nails from old style puddle bars and are all Iron Nails. There are still a number of mills which make the old style Iron Nails in the old style way—that is, of buying strictly wrought iron scrap and old iron rails and making a box pile and rolling this into Nail plate and cutting Nails out of the plate.

It is a fact that any amount of strictly iron scrap can be had which has not been mixed with steel. Any mill can buy iron rails and strictly No. 1 railroad

wrought iron, and they will not find one piece of steel in the lot. We think we can say without fear of contradiction that Iron Nails made from strictly old iron rails and No. 1 railroad wrought are the best Nails on the market to-day, superior to the Steel Cut or Wire Nails, or to the puddled Iron Nails.

The writer of the article is evidently a manufacturer of Steel Cut Nails and not Iron Nails, and, seeing the trade again demanding the old Iron Nails, takes the means he does in his article to try to injure the Iron Nail manufacturers.

We notice in your issue of June 16 an article on Iron Cut Nails, in which the writer makes the sweeping assertion that "there are no Cut Nails made at this time from puddled iron." This statement is not indorsed by the facts. Cut Nails have been made of puddled iron, in our experience, which covers more than an average generation, and are still being made. It is true that steel scrap enters, perhaps largely, into the manufacture of Nails marketed as iron, but when the broad charge is made that no Nails are made of puddle bar, we must take an opposing position. The inferential charge that all Nails made of steel scrap are of "inferior quality," and are "imperfectly welded" and "afflicted" with "cold shuts, cracks and slivers" is also open to contradiction. The steel scrap is piled with puddle bar covers, and the result, in our experience, has been a very satisfactory Nail.

The article in question is correct to a certain extent. There is a great deal of scrap used to make Iron Cut Nails, although it would still be possible to produce an Iron Cut Nail from puddle iron, but the condition of the Nail market at the present time would hardly warrant any mill to manufacture a strictly Puddle Iron Cut Nail, as it is impossible to produce muck bars made from all No. 1 pig iron to compete with steel slabs; consequently in order to produce an Iron Cut Nail the manufacturer uses a certain amount of scrap in order to come out even with the Steel Cut Nail.

In reference to people from the West paying 15 cents per keg extra for Iron Cut Nails, we are not in a position to say if this is correct or not, as our trade from the West is very small, although it appears that every inquiry we had for Cut Nails from the West specified for Iron Cut Nails, but at the same price as quoted by the Cut Nail Association.

## TRADE ITEMS.

THE UNION METALLIC CARTRIDGE COMPANY have issued a very attractive Fourth of July hanger in the interest of their U. M. C. Blank Cartridges. Those in the trade who have not received a copy and wish one can obtain it by addressing the company at 313 Broadway, New York.

As a souvenir of the occasion Henry Disston & Sons, Philadelphia, Pa., prepared a useful and attractive paper cutter for distribution to those who attended the recent banquet tendered by the manufacturers to the Southern Hardware Jobbers' Association at Atlanta, Ga.

F. McQUEEN, representing a number of Eastern manufacturers, with headquarters at Sherman, Texas, has recently been enjoying the attractions of New York City.

JUSTUS A. TRAUT celebrated the fiftieth anniversary of his connection with the Stanley Rule & Level Company, New Britain, Conn., on the 14th inst. Mr. Traut has been prominent in the Stanley shops for many years as an inventor, several hundred patents having been issued on his improvements in the company's tools. Moreover, he has been a very popular foreman, as was evidenced by the deep interest taken by the employees of the factory as well as the officers of the company and the heads of departments. The employees of his department presented him with a handsome and elaborate silver loving cup and a bouquet of rare flowers. Mr. Traut gave a dinner to the Foremen's Club of the Stanley Company, of which he is president and also the dean, at the Allyn House, Hartford. Among the guests of honor was Governor Chamberlain of Connecticut, a former employee of the company. On the 15th inst. Mr. Traut gave a picnic at Rentschler's Park for the employees.



## FACTORY COST AND BUSINESS METHODS.

### METHODS OF INCREASING EFFICIENCY OF WORKMEN

THE WILCOX MFG. COMPANY, Aurora, Ill., are putting into practical application many novel ideas originated by D. W. Simpson, their president and general manager. Mr. Simpson long ago overcame union domination and has consistently worked along the lines of developing the worth of the individual workman, rewarding proficient records suitably from time to time. On or near every machine that is operated are pasted the following three stickers, which the workmen are forced to read by reason of close contact. They are so full of meat and good sense that other manufacturers may see fit to utilize them:

#### SOME WORKSHOP HINTS.

- "Good enough" is not good enough.  
Nothing is done well enough if it can be done better.  
Never commence a piece of work till you know how you are going to do it.  
Do nothing by guess; any fool can "guess."  
Don't depend on brute force; the difference between a man and a mule is that a man has brains.  
A French proverb says that "A bad workman always complains of his tools." It is also true that a bad workman usually has tools to complain of.  
A slovenly workshop is usually an indication of slovenly work done in the shop.  
One minute spent in putting away tools when through using them is five minutes saved when you need them again.

#### HOW TO MAKE HASTE.

- Do you know how to hurry? This is a hurrying age, and you ought to know how to keep up with it. If you think it worth while, here are a few suggestions, written for busy men, that may help you:
1. Do nothing that you don't have to do. Cut out the nonessentials.
  2. Don't hesitate. Begin at once. When you are through, stop, and begin on the next thing.
  3. Don't be too particular what part of the job you begin with. Other things being equal, do what is under your hand first, and the next nearest thing next.
  4. Don't pause between jobs.
  5. Don't go from one job to another until the first is done. Do one thing at a time. It takes time to change your mind.
  6. Do your thinking while you are acting, and think about the work now in hand.
  7. If you have assistants, use them. At first, do only what they can't do; afterward help them out.
  8. Do nothing twice. This makes it necessary to do it right the first time.
  9. Don't lay down one tool except to take up another.
- If you follow these rules, and a few more that you can make yourself, you will be able to reduce your working hours about one-half; you won't think you are hurrying; you won't be bored and worn out by your work; and when it is over you can go home and romp with the baby with an approving conscience and a mind at rest.

#### ORDER.

"A workman is known by his chips," not only by the size and number of chips he makes, but also where they fall and whether they are allowed to remain. Your chips are the pieces of metal and wood you handle as well as the waste product. Neatness and order about your work are next in value to skill and count for your salary and success.

Keep things where they belong. Do not scatter. Time spent in needless cleaning is wasted. Your neatness about your bench or machine is important, and the sweepers will take care of the rest.

WILCOX MANUFACTURING CO.

Mr. Simpson informs us that the moral effect of these stickers has been almost incalculable and that the standard of individual efficiency of the workmen is increasing from day to day.

### Weekly Meeting of Heads of Departments.

Shop efficiency is also furthered by weekly meetings of foremen and heads of departments. Each man is expected to have something to say at every meeting for the good of the cause, either in criticism of present methods or by way of suggesting improvements.

### ROCK ISLAND PLOW COMPANY'S QUARTERLY PRIZES TO EMPLOYEES.

On January 1, 1904, the Rock Island Plow Company, Rock Island, Ill., inaugurated a suggestion system as explained below. The prizes, it will be seen, were made liberal, in order to offer special inducements for co-operation on the part of their employees. The features of the company's plan are announced in the following circular, a copy of which was given to each of their workmen:

#### Quarterly Prize Distribution to Employees.

ROCK ISLAND, ILL., December 16, 1903.

It is always the aim of this company to secure the intelligent co-operation of our employees in all departments, and we consider this feature of the greatest importance to the successful progress of the implement manufacturing industry.

To encourage this co-operation in a way that will prove to be of material benefit to them, we invite from all employees practical suggestions of any kind, either as regards the machines which we make, the means employed for making them, or the facilities for performing any kind of work in connection with our business.

Write out your suggestion fully, so that it may be readily and thoroughly understood, sign your name and street address, and note thereon the department in which you are employed; date it and place in sealed envelope, marked "Suggestion for use of Rock Island Plow Company," and deposit in a box placed in the superintendent's office for this purpose. Be careful to comply with all of the above instructions, in order that you may have a fair chance for the prizes.

For the ten best suggestions which we find it practical to adopt or use that are received during each period of three months, we will pay the following cash prizes.

| GENERAL WORKMAN'S PRIZES. |                  | FOREMAN'S PRIZES. |                  |
|---------------------------|------------------|-------------------|------------------|
| First.....                | \$25.00 in gold. | First.....        | \$25.00 in gold. |
| Second.....               | 20.00 in gold.   | Second.....       | 20.00 in gold.   |
| Third.....                | 15.00 in gold.   | Third.....        | 15.00 in gold.   |
| Fourth.....               | 10.00 in gold.   | Fourth.....       | 10.00 in gold.   |
| Fifth.....                | 5.00 in gold.    | Fifth.....        | 5.00 in gold.    |

The above prizes are offered for suggestions of any kind that will improve our business, and are open to the energies and efforts of every employee.

Distribution will take place every three months, on the 10th day of April, July, October and January, and will cover everything deposited up to the last day of the preceding month. The first distribution will occur April 10, 1904.

Any suggestions not accepted by us and paid for, as proposed, will be returned upon request to those who make them. It will be understood that any suggestion of this character which is made to and paid for by us, under these conditions, becomes our property absolutely by such payment, and should we conclude that the suggestion contains matter of a patentable character and we think it worth protecting by letters patent, then the suggestor agrees to execute all papers that may be necessary to secure such patent or patents and place title to same in our name, all expenses in connection with such patents to be paid by us.

By following carefully these instructions as given, every employee may reap the benefit of a little extra thought and consideration or labor on his part and assist in the upbuilding of a business, the welfare of which means the welfare of each and every employee.

ROCK ISLAND PLOW COMPANY.

A. H. HEAD, General Superintendent.

The experiment has thus far been attended with a fair measure of success as indicated by the number of suggestions received during the period ending April 1 and the value of such suggestions. During the second quarter up to the present time they have received a considerably larger number of suggestions, which they refer to as of a practical nature, and indicating that employees are using their brains as well as their hands. The company hope to make this feature popular as well as productive of good to employees, and trust that the results will show enough benefits to the company to justify the expenditure of the amounts necessary for the quarterly payment of prizes. The interest thus aroused will, it is expected, stimulate and secure better methods and be found advantageous in the conduct of the business.

## TRADE CHANNELS FOR BUILDERS' HARDWARE.

*We are in receipt of the following interesting communication from a gentleman who has had large experience in this line. He discusses the question of the distribution of Builders' Hardware in a way that should be suggestive to the trade:*

**T**HE questions brought up from time to time by letters in *The Iron Age* in regard to the sale of Builders' Hardware and the hardships under which retail merchants suffer are certainly among the most important and at the same time the most difficult that command the attention of merchants and manufacturers. For the purpose of considering the question in all its aspects this line may be divided into three classes, as follows:

### I. Goods the Dealers Carry in Stock.

These comprise cheap Locks, Knobs and Escutcheons in popular designs and a miscellaneous assortment of Catches, Lifts, Pulls, Turns, Fasteners, &c. These are largely sold over the counter. If a building is trimmed from such a stock it is usually a low priced competitive job in which the profit is small. The character of the stock varies with the size of the city and the importance of the merchant, but even where it includes some of the trimmings in the better class of Bronze Goods the patterns are confined to popular styles, bought in quantities.

This trade, by all precedent, and according to general trade practice, should belong to the retailer, and the manufacturer should leave it strictly alone. If a merchant will put goods in stock it is surely *prima facie* evidence of his ability to sell them. It is difficult to understand how any manufacturer can advance a reason for selling such goods direct in a region where he has a retailing customer handling the same assortment.

### II. Finer Goods Not Carried in Stock, but Sold from Sample

and shipped by the manufacturers ready to be delivered, in original cases, with openings marked. This is the class of goods which forms the basis for most of the trouble. Builders' Hardware sample rooms, many of them expensively fitted up, are provided, trained men are put in charge, samples are nicely mounted, and pains are taken to provide means for doing the business. Where this is done, where the dealer shows an ability to handle this class of trade, and the manufacturer evidences his appreciation of the fact by quoting prices to the dealer, and to all appearances putting him in a position to take orders, what valid reason can he advance for competing with his own customer?

It is true that to successfully carry on a business in this field requires a considerable amount of special knowledge and experience and salesmen of ability, but except in very special cases a good Builders' Hardwareman working for a merchant can handle the trade, and should be allowed to do so. If the Hardwareman will fit himself for taking contracts for house trimmings, and if the manufacturer shows his willingness to sell him such goods by quoting prices, surely this field belongs to the dealer, and the manufacturer is infringing upon the dealer's rights if he sells contractors in the dealer's territory.

If the dealer is to be in a position to complain of the manufacturer's trespasses he must demonstrate his ability to make sales independently. Just so soon as he calls for special concessions or for aid in doing the business he loosens his claim upon the business and throws himself upon the manufacturer's indulgence. It is too often the case that a manufacturer is forced to do the business direct and allow the dealer a commission to retain his good will. It is becoming too frequent a practice for the dealer to send the manufacturer a schedule of Hardware which at regular prices will foot to a small sum—very often less than \$50—and insist upon a special price. If the goods are not wanted when ready, he must take them into his warerooms and carry the account, as with any other merchandise he may sell for future delivery. If he will handle the business upon such a basis there is no good reason why he should not sell the Hardware for

trimming any building in his territory, from the big skyscraper down, for which he can get orders.

### III. Special Goods, and Individual Designs.

Here, if the dealer is to handle the business, he must act as the manufacturer's agent, for the nature of dealings in this class of goods tends to bring the producer and the merchant into close relations. The factory designer must design the special patterns or the factory mechanical engineers devise the appliances for special purposes, and the shorter the distance between the ultimate principals in the transaction the better the prospect for a satisfactory conclusion. If the dealer would handle this business he must so acquaint himself with the capacity of the manufacturer for supplying the goods and so demonstrate his ability to serve both manufacturer and contractor or owner as to deserve consideration. If he has the proper organization he can do it. If not, he should not grumble if the manufacturer sells direct to the contractor and he finds himself ignored.

### Large Builders and Contractors Want to Buy Direct.

There is one phase of the trade with contractors that merits attention, and that is the unwillingness of many of the large builders to do business with a middleman, preferring to buy Builders' Hardware direct. What shall be done in such a case? Shall the manufacturer try to force the unwilling contractor to buy from a dealer? Shall he ignore the dealer and take the order? Shall he pocket the profits on the deal or hand over a share in the shape of an unearned commission to the dealer who couldn't do the business?

It would seem, again, that the fairest solution would be to put the question upon the basis of the dealer's ability. If he can win over the contractor, the business should belong to him without interference. If he cannot, he should not expect to reap an unearned profit from the manufacturer's efforts.

In most of the principal cities of the country the Hardware dealers control the Builders' Hardware business and pocket the profits. If dealers in New York and other Eastern cities who suffer encroachments upon their trade would do the same, they must prove that they are able to handle the business, and the manufacturers must be willing that they should do so. If the dealers can make it clear to the manufacturers that it will be to their advantage to abandon the expensive solicitation for contractors' business, it will, doubtless, be done. If the argument of the balance sheet is not in the dealers' favor little else will avail. In any event a definite understanding would be a good thing for all concerned.

## REQUESTS FOR CATALOGUES, &c.

*The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.*

REQUESTS for catalogues, price-lists, quotations, &c., have been received from the following houses:

FROM BAILEY-DONK HARDWARE COMPANY, Sheffield, Ala., wholesale and retail dealers in Hardware, Building Material, Furniture, &c.

FROM THE FRANK STEPHENS COMPANY, Eagle Lake, Texas, dealers in Hardware, Wagons and Buggies, Stoves, Sporting Goods, Farming Implements, Threshing Machinery, Steam and Gasoline Engines, &c.

FROM W. S. THOMAS, Iowa City, Iowa, who has lately succeeded Lichty & Thomas in the General Hardware business.

BUTLER BROS., who are a wholesale catalogue house selling retail merchants exclusively, have favored us with a framed picture of their Chicago plant. The view was taken at night and shows the mammoth establishment entirely illuminated, making a very effective picture. The company also have large houses in St. Louis and New York City.



## THE CATALOGUE HOUSE QUESTION.

**W**E are advised that quite a number of manufacturers have expressed a willingness to co-operate with the National Hardware Association in its efforts to reduce the evil resulting from the competition of catalogue houses. Some time ago this association asked the Axe manufacturers to consider that catalogue houses were simply large retail dealers and to treat them accordingly. This matter was again brought to the attention of these manufacturers a few days ago by the officers of the National Hardware Association, and they unanimously decided to treat catalogue houses in the future no better than they would any other reputable retail dealers. This same position, we understand, has also been taken by several manufacturers in other lines. The members of the National Hardware Association have all expressed themselves as opposed to dealing with catalogue houses on any basis.

### Committee on Catalogue House Question.

Following is a complete list of the gentlemen who will meet at the Hotel Jefferson, St. Louis, on the 27th inst., to discuss the catalogue house question and the lines on which the committee should work to promote the interests of the various departments of the trade, as referred to in our last issue:

NATIONAL RETAIL HARDWARE DEALERS' ASSOCIATION: W. P. Bogardus, Mt. Vernon, Ohio; E. M. Bush, Evansville, Ind.; T. Frank Ireland, Belding, Mich.; S. R. Miles, Mason City, Iowa; M. L. Corey, Argos, Ind.

SOUTHERN HARDWARE JOBBERS' ASSOCIATION: R. M. Dudley, Nashville, Tenn.

NATIONAL HARDWARE ASSOCIATION: Samuel A. Bigelow, Boston, Mass.; S. Norvell, St. Louis, Mo.; T. James Fernley, Philadelphia, Pa.; R. A. Kirk, St. Paul, Minn.; W. S. Wright, Omaha, Neb.

This committee will be recognized as an able one and thoroughly representative of the merchants of the country, and the whole trade will await with interest the result of their deliberations.

### LETTER FROM A WELL KNOWN RETAIL MERCHANT.

*To the Editor:* During the last six weeks discussion of the catalogue house question in your columns has brought enlightenment in many ways to interested readers. To the retail association membership it brings keenest satisfaction, since they now see that all their labors of the past five years are not in vain. Nor will we soon cease to regard Mr. Norvell as the Moses in this wilderness, since his most forceful and convincing presentation of the subject is an opening wedge, and I truly believe the beginning of the glorious end for which we strive. All honor to him and the many others who are lending their aid to a solution of this subject. Well do we all know, and fully do we appreciate the effective work in this line of the National Jobbers' Association. Now comes the Southern Jobbers' Association to our aid.

With such a vallant advance line as our friends, the jobbers, will form and the solid ranks in their rear of the retailers of the country, keeping step in every move of their leaders, who can stand against our attack? When several years ago we seemed to be making little progress in this, our principal aim, the writer well remembers saying at a convention, "We will have to continue discussing and hammering upon this subject till we gain the attention and enlist the aid of the jobbers; not till then will we succeed in getting relief." And thanks to our persistence, the thing is done. It would be a vain effort to attempt to add anything to the arguments already ably presented, but perhaps to touch briefly some of the points and issues raised by this discussion may not come amiss.

### THREE REMEDIES

of the evil stand out prominently:

First, the manufacturer should not sell such houses at all; or, second, he should name such high prices as will prove unattractive; or, third, he should regulate the minimum price at which his goods shall be sold.

All admit that the catalogue houses are retailers, and retailers only. Why, then, are they favored over their competitors, the legitimate Hardware retailers? This seems the gist of the whole matter. Mr. Norvell has well said, "Catalogue houses do not create a demand for goods, the demand has been created by others," and largely by the retailer who has invested in, displayed and talked them.

All admit that the catalogue house has a right to do business. That is Americanism. But if the manner of doing this works great injury to others interested—manufacturers, jobbers and retailers—self preservation certainly justifies an effort to lessen the injury, which is good Americanism also. Let those manufacturers whose interest lies in selling catalogues first establish a minimum price at which goods shall be sold. To know what this price must be manufacturers must first become posted upon what is a living price for the retailer. Some representatives of the goods offered for sale in these catalogues at about 10 to 12 per cent. above the cost to close buyers think the retailer can get rich on this per cent. of profit. The manufacturer must learn better. That 10 or 12 per cent. may protect the jobber, but where do we come in who buy of this jobber? The per cent. to do business is considerably higher for the retailer than for the jobber. Let the manufacturer add to the jobber's per cent. of profit a reasonable one for the retailer, with due allowance for poor years, &c., and he may approximate a just minimum for the cataloguer.

### SOME JUST CRITICISMS

are made in these discussions of the retailers who are not up in modern business methods. Move up, gentlemen, the race is not to the slow these days. The reference made by the J. Stevens Arms & Tool Company to prices charged for Ranges, Dampers, &c., certainly cites an isolated case, but one which well points his argument. Mark my word, that merchant is no member of a State association, nor is he who made his boast of a county association establishing such marvelous prices. The Stevens Arms & Tool Company are a bit scornful of the retailer. The jobber comes in for his share, but can answer for himself, but we retailers will forgive the Stevens Arms & Tool Company because of the straight course with the catalogue house which they tell us their company have pursued.

A stock argument is "the advantage of meeting in person your customer, who simply needs to be shown his duty in keeping his money at home; to be told of the difference in goods (which he easily sees upon your shelf bearing the same name, number and maker as in his catalogue); to be told that he must pay them cash in advance," &c. These are moving arguments, no doubt, but the chronic catalogue buyer is apt to keep pretty still about it; nor does he come to you to discuss the matter. How many buy, and say nothing, the express companies and freight agents can best tell.

### MANY MANUFACTURERS DO NOT KNOW

that farmers club together for their orders to catalogue houses, pro-rating freight charges, and that mechanics in factories and carpenters in "gangs" do the same. Nor do they prelude their orders by consultations with retailers as to "money used at home, quality of goods, cash paid in advance, &c." The freight charged pro-rated this way is almost nothing. The news of their bargains goes from neighbor to neighbor and the disease spreads. So, while that loved and long used argument, "by the time postage and express charges are counted,

you can sell as low as they," may hold good where one or two articles are bought, clubbing is its death blow, and in clubbing most of our trouble comes. The same may be said of "meet the price," since almost every article in your line stands priced in the catalogue, but where will you be when you meet all these cuts? Then is it just to the home buyer to charge him more for goods than the man who often buys abroad with whom you are "meeting the price?" And in that very way lies all the trouble you are looking for. How about No. 1 when he learns how much better you do for No. 2?

#### BUYING FROM JOBBERS.

The charge is made that the catalogue houses have a source of supply, when manufacturers refuse to sell them, from jobbers, some in and some out of the association. We know no more honorable body of men than those engaged in jobbing Hardware, and when selling those houses is discouraged by their association members will live up to it. Should there be jobbers who fail to do this, whether association members or not, the united efforts of the manufacturers, jobbers and retailers can certainly place the guilt where it belongs, and we do not believe they will long continue in their sins when publicity brings the natural result of contempt for and avoidance of those using such unfair methods.

Back to these arguments we hark with a closing remark that the catalogue house as it now exists and the legitimate retailer of Hardware cannot yet lie down together. The millennium is not yet. One or the other may survive—not both. "The two systems cannot flourish side by side in the sale of the same line of goods."

E. M. BUSH.

EVANSVILLE, IND.

### A BRITISH VIEW OF THE CATALOGUE HOUSE QUESTION.

FROM OUR LONDON REPRESENTATIVE: The interesting discussion now proceeding in *The Iron Age* on the several problems raised by the development of the catalogue house is of interest to British readers, although not in the same degree as to their American colleagues. The catalogue house is just beginning in England in the form in which it exists in America, although, of course, the middle class co-operative stores are largely in their structure similar to the catalogue house. As one who sees it coming, and, so to speak, in the making, I am tempted to offer for what they may be worth a few observations upon the question. As has already been pointed out, the issue raised in a very marked manner draws together the jobber and the retailer. They are both threatened; they must in concert protect themselves.

Perhaps because it is so obvious, it is a curious fact that in the discussion which proceeds the real dominating factor is not discussed. Surely, the most prominent and enduring factor in the situation is the intrinsic value of the catalogue as a business bringer. To make such a statement as this may appear at first sight futile, but it is surely the root of the whole difficulty. Assuming the housewife has money to spend and seeks to lay it out to the best advantage, the catalogue is the best instrument for her purpose. She feels she is not being rushed into counter bargains by the clerk; she is not hurried; while the endless variety of goods suggested by the catalogue gives her a wider selection than she can possibly have by entering any given store, no matter how well founded it may be.

In short, a catalogue is an uncommonly profitable commercial traveler. It shows its goods clearly and without circumlocution; it costs nothing for hotel bills and railway fares; it is constantly at the elbow of the buyer, and is always a source of temptation. Distribute even a small and incomplete catalogue among your customers, and one thing is certain: It will be scanned with curiosity, if not with interest, in a larger proportion per 100 distributed than would be the case with any other document. The retail Hardwareman in England who has enough enterprise to put together an attractive catalogue finds that it pays. If, in addition to Hardware,

the catalogue received contains something of everything in all departments of trade, it is merely the more enticing. In short, the better the catalogue, the better the business.

We are told over here that the catalogue house thrives in America because of long distances; that they cannot thrive in England because here short distances are the order of the day. I see no reason for this argument, look at it how we may. If a person buys from a catalogue the quicker the delivery of the goods ordered the better the purchaser is pleased. Therefore, to purchase from a catalogue house at short distance—other things being equal—is more to the mind of the buyer. I cannot offer any American experience on this point, but I am satisfied that, assuming we had the catalogue house in full swing in Great Britain, Manchester buyers would buy from the Manchester catalogue house, Glasgow buyers from Glasgow, London buyers from London, and so forth. The user of the catalogue takes no stock of distance; it is the variety of goods set forth in the catalogue and their attractive setting which win the day. In the one or two catalogue houses that we have over here, mainly dealing with the poorer classes, distance does not count in the least. It is the nature of the catalogue and the completeness of the trade organization.

How, then, is catalogue house competition to be successfully combated? One form of co-operation to meet catalogue competition must be closer and more intimate response between jobber and retailer in producing the best pictorial presentation and price quotation of the whole range of Hardware goods.

**How to Meet Catalogue Competition** Even if hearty co-operation be established in the production of a catalogue between the Hardware jobber and retailer the battle has only just begun, for the home buyer wants to be told about dry goods, groceries, drugs, &c., and a purely sectional catalogue does not, therefore, meet the case.

This brings me to the most important aspect of the struggle now taking place between the large catalogue house and the retail trader. The catalogue house is winning because it takes the various kinds of retail trades in detail and beats them separately. If, however, the retail trades were in some way united, then it seems to me we are in a fair way to hold our own and more than hold our own against the distant competitor. Now let us suppose that the Hardware jobber and retailer have between them produced a really valuable Hardware catalogue; let us next suppose that the jobbers and retailers in the other trades concerned have followed our example. Surely the next step is for these trades to come together and consider how best in any given locality to present a catalogue and deliver goods more speedily and as cheaply as anything the distant catalogue house can do.

If six different traders in different lines of goods in one locality, backed by their wholesale clients, were to meet and produce a local catalogue of worthy proportions I believe it would strike a more effective blow at the catalogue house than any other human arrangement that I can think of. The catalogue house is not a menace to the hardware trade in particular. It is a menace to the whole retail trade of every category.

**A Menace to Every Trade** The real line of attack or of defense for the retail trades, either of America or of Great Britain, is to seize the

merits of the catalogue house system, and, bettering their instruction, regain their trade; to drive home certain obvious demerits, as, for example, the difficulty of examining goods in stock. If a combination of local traders were jointly to issue a catalogue they would have this indubitable advantage over the catalogue house: their goods can be locally examined and more easily exchanged if such be desired.

Of one thing I am sure. No combination of jobber and retailer against the manufacturer who supplies the catalogue house is within the realm of practical politics. Experience teaches us that where this is attempted it only throws the manufacturer attacked more closely into the arms of the enemy, and therefore strengthens the enemy's efficiency.



## A WHOLESALE CATALOGUE HOUSE ON CATALOGUE HOUSE QUESTION.

Butler Brothers, New York and Chicago, who communicate with the trade through catalogues instead of by traveling salesmen and have built up a large business on this basis, emphasize the fact that their methods are radically different from the retail catalogue houses, inasmuch as they, Butler Brothers, sell exclusively to merchants and not at all to consumers. In bringing their goods to the attention of the trade they use a monthly bulletin, in the forthcoming number of which they discuss the catalogue house question in an extended article, from which we make the following extracts:

### The Retail Mail Order Problem.

*The Iron Age*, the oldest paper in the Hardware trade, is printing a series of articles on the retail mail order question. The number and nature of the letters from retail Hardwaremen therein printed show how keen is their interest in the problem, and how anxiously they are seeking a solution.

Frankly, in our opinion, there is commonly too much heat and too little light in discussions of the mail order question. The evil will not be remedied by idle complainings nor angry denunciations in State or national Hardware associations. It must be looked squarely in the face. A study should be made to find why the mail order house in a distant city is able to win business away from retail stores close at hand. The best brains of the merchants of America should be used to map out a plan of campaign. And then you retailers should FIGHT. Let your irritation find vent in action, not in supine grumbling.

The retail catalogue man knows he can get business only by selling goods cheaper than you do or by *seeming* to do so. Therefore he picks out in each line the comparatively few well known items and prices them with little or no regard for cost or value. These are his "baits." He dangles them seductively under the noses of his victims. He wants people to infer that he is equally cheap on everything else—which they are apt to do unless you retailers undeceive them.

The merchant is wrong who thinks the retail mail order houses sell the bulk of their wares cheaply. They do not, because it costs them too much to do business. High rents, city rates of clerk hire, an infinity of detail—all these force their ratio of expense way up beyond that of any economically conducted retail store. To cap it all, their advertising adds a straight TEN PER CENT.

The effort to persuade manufacturers to refuse to sell the retail mail order houses is perfectly legitimate, but, so long as human nature is what it is, can hardly be of much avail.

Nothing is gained by blinking the fact that in matters of this nature we are all selfish. The maker's first concern is for himself, the jobber's for himself, the retailer's for himself. If any one tells you that he puts your interest before his own, he does not flatter your intelligence.

We sympathize with the end sought to be gained by binding the maker to the jobber and retailer, but we very much fear that he who hopes the plan will accomplish much real good is putting his trust in a rope of sand. It is our settled conviction that nothing will be done of real and lasting benefit to the retailer in this matter except that which he accomplishes by himself and for himself.

The problem is an ugly one, but it is not incurable. It is a harder one to meet to-day than it would have been ten years ago. But let things drift another ten years and it will be infinitely harder to meet. The time to act is NOW.

THE HOLLANDS MFG. COMPANY, Erie, Pa., have made application for increase of capital stock from \$20,000 to \$100,000. The company are manufacturers of Vises, Machinists' and Plumbers' Tools, &c., and started in business in Erie in 1887. It is intended to make material additions to the plant and later to build a new foundry.

## Hardware Organizations.

### New England Hardware Dealers' Association.

The June meeting of the Executive Committee of the New England Hardware Dealers' Association was held at the rooms of the Boston Merchants' Association, 77 Summer street, Boston, June 14, Vice-President John B. Hunter presiding. Nine applications for membership were read and accepted. The principal topic for discussion was the catalogue house question, and a number of local cases of competition entailing loss of business to New England dealers were cited. The secretary was instructed to keep minutes of reports and complaints as regards catalogue house competition for his annual report. It seemed to be the sense of the meeting that such competition in New England is yet in its infancy. The work of the National Retail Hardware Dealers' Association was discussed, and the informal sentiment appeared to be in favor of application for membership in the national body in the near future. After the transaction of routine business the committee adjourned until September.

### Nebraska Hardware Mutual Insurance Company.

Members of the Nebraska Retail Hardware Dealers' Association organized a State Hardware Insurance Company on June 16. The following officers were elected: President, H. J. Hall, Lincoln; vice-president, F. D. Kees, Beatrice; secretary, F. T. Shepard, Lincoln; treasurer, J. F. Goehner, Seward. Board of Directors: Chas. P. Schneider, Syracuse; Thos. Nelson, Diller; A. E. Small, Crete; Leon Baker, Lincoln; Ernst Hoppe, Lincoln; Nathan Roberts, Omaha; F. C. Harrington, Pawnee City; S. C. Oaks, Seward; L. F. Halloway, Fremont.

### Connecticut State Association of Retail Hardware Dealers.

The following circular letter in regard to the summer meeting of the Connecticut State Association of Retail Hardware Dealers has just been issued by the secretary of the association:

The summer meeting of the Connecticut State Association of Retail Hardware Dealers will be held at Mamauguin, July 13, 1904. Mamauguin is just east of New Haven and may be reached by trolley line.

The business meeting will be called to order at 10 a.m., and dinner will be served at 1.30 p.m.

The committee have arranged a very attractive menu, which will cost \$2 per plate, and the members are urged to notify the secretary, Charles L. Way, 43 Columbus avenue, Boston, Mass., how many of each firm will be present. As this urgent, kindly do not delay, but send in your name or names on inclosed postal card at once.

The secretary would urge that the members of this association make a special endeavor to be present at this meeting, as several matters of vital importance to our association will come up for attention, and it is necessary that we should have a large attendance, so that each and every member may know of and discuss these matters. We have only two meetings each year, and, as the association is of undoubted influence and benefit, it behooves each member to make an especial effort to be present and bring new members with him. We want all the retail Hardware firms in the State in our association, and the only way to do this is by personal persistent effort. Let every one get a move on and see how many new members they can bring with them.

The committee have arranged to have representatives of the leading Builders' Hardware manufacturers present, to get them to agree to furnish the retail dealer the protection he is entitled to on their lines. Let the large attendance show your appreciation of the efforts of your officers and committee for the good of the association.

Do not put this one side—do it now.

C. E. MILLER, secretary of the Philip Gross Hardware Company, Milwaukee, Wis., has returned from a two months' trip in the Philippines, where he devoted much of his time to an investigation into the possibilities for business in the islands. He returned convinced that capital can be invested in the new possessions with profit.

## BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,  
NORFOLK ST., LONDON, W. C., June 11, 1904.

### The Week's Hardware Trade.

THE British Hardware trade is again in a state of stagnation. The stimulation in the market which was experienced with such pleasure and, let us hope, profit prior to the Whitsun holidays has disappeared, and again we find orders hard to come by, and money still more difficult to collect. The fine weather recently experienced over here has led to a number of orders coming from seaside resorts from the north of England and from Scotland, but, taking the home market as a whole, it is generally in a disappointing condition. When trade is stagnant the disposition always is to push the export trade, and this is precisely what is happening. On the first five months' export trade of this year there is an increase of £123,352 on Cutlery, Hardware, Implements and Instruments, the total export trade done being close on £2,000,000. During the same period the imports of Cutlery, Hardware, Implements and Instruments reached £339,850, a decrease of £75,000, indicating, I think, clearly enough that prices are so cut that imported goods find it hard to make a living. There can be no doubt, however, that both American and German Hardware and Cutlery can come down in price when so disposed, and the imports, therefore, can be substantially increased when the market necessitates.

The activity in the export trade accounts pretty generally for whatever business is being done in the home trade. Thus, the Edge Tool trade is active, orders running largely on Spades, Forks, Shovels and Hoes, but they appear to be chiefly on export account. Our most progressive markets at present are India, Argentina, Brazil, Australia and New Zealand. The South African market shows no improvement.

Another factor making for stagnation is the disposition of the Government to cut down expenses wherever possible. The Treasury is at present taking a very narrow interpretation of all votes of supply, so that Government orders are only for urgent necessities. The War Office has just given out contracts for about 7000 tons, half of which are Hand Saws. Tenders are also being invited by the same department for Joiners' and Edge Tools. The quantities are large, the specification covering about 30 foolscap pages. Some of the orders have been placed with jobbers, who can, of course, subject to the terms of the specification, procure their goods where they choose.

As to the general condition of trade throughout the Hardware centers, the experience of Wolverhampton is typical. The following points from a report of the Wolverhampton Chamber of Commerce are, if anything, too optimistic. The report expresses the belief that the trade has seen its worst and that better things may be looked for. The Galvanized Iron trade has continued to expand during the past year, though at not so rapid a rate as during the previous year. The increase in exports amounted to 6 per cent. last year, as against 32 per cent. during 1902. This exhibits a fairly satisfactory state of trade, but the rapidly growing capacity of works near the coast has brought about a temporary over-production and prices fell very low during the latter half of the year, in spite of increasing consumption. Our best customer during 1903 was South Africa, with India a good second. Promising young customers are Japan and Canada. There has been a very good demand throughout the year for all kinds of Edge Tools, Spades, Shovels, Hoes, Horseshoes and the like, mainly for export. Employment in the Wrought Enameled Ware trade has not been so regular as heretofore. Sales have tended to fall off.

The Lock trade, which is chiefly located in Wolverhampton and Willenhall, has had a very abnormal experience during the past year. From the end of October, 1902, to the middle of January, 1903, the trade was paralyzed by one of the most determined strikes among the workmen ever recorded. It ended in a submission of the men. The three months' stoppage of production resulted in a congestion in the supply of Locks on the

part of the manufacturers rarely, if ever, equaled, and all the available stocks were cleared out. After the resumption of business the Lock makers throughout the district were extremely busy, and it was with the utmost difficulty that they could satisfy the urgent demands of their customers. This state of things continued until the close of the year, since when the demand has greatly slackened. The Brass foundry trade was quiet throughout the year.

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## PRESIDENT BIRGE'S BANQUET ADDRESS.

**F**OLLOWING was the address of Julius C. Birge of St. Louis, president of the American Hardware Manufacturers' Association, at the banquet tendered by that body to the Southern Hardware Jobbers' Association on the occasion of the recent conventions at Atlanta. Mr. Birge's references to the social and industrial conditions of the country will be regarded with special interest and approval:

The life of a busy Hardware convention is brought to a close, and we are here for the parting. I am asked to speak upon a subject which leads me to make a few remarks on Hardware. Rather than lead your thoughts toward your busy stores and to remind you of the forge's blast, it would undoubtedly improve "our relations with our guests," which is our topic for to-night, if

"This night should be given to music,  
And the cares which infest the day  
Should fold their tents like the Arabs  
And as silently steal away."

But we must say a word concerning our relations to our guests, the Hardware jobbers. An old negro down in Georgia, who had at the risk of his life saved from drowning a little negro boy with whom he had been fishing from a log, in explaining his self sacrifice, said: "Gentlemen, that boy has got all our bait in his pocket." The close relations between the manufacturers and the jobbers are due in part to the fact that the jobbers have all the bait in their pockets. Possibly the manufacturer might fish in other waters, and seek for other classes of customers, but judging from some delicate hints which have been thrown out during the last two days, this would hardly be regarded as proper. At present we are occupying the same log. Our mutual success depends on the safety and prosperity of the jobber, and possibly, in some degree, on the survival of the manufacturer.

But there are other and higher relations which exist between us, and these have been strengthened and broadened as the years have passed, and largely through occasions like this. I beg in this connection to read a telegram just received:

St. Louis, Mo.—Mr. Douglas unites with me in thanking you, the manufacturers and jobbers, for unusual courtesies, which are thoroughly appreciated. E. C. SIMMONS

## WOMAN'S PART IN MANUFACTURING DEVELOPMENT.

But what are the relations of the ladies to the development of our manufacturing industries? It was Mrs. Green of Savannah, of this State of Georgia, who first conceived the idea that the fiber could be separated from the seed of the cotton by machinery more economically than it had been done by hand, and her idea was patented by Eli Whitney. The cotton gin invented by Mrs. Green led to the development of your greatest Southern industry; it started spindles and looms throughout England and America and revolutionized the social, industrial and political conditions of the entire United States. It was his wife, with her spinning wheel, that led Hargreaves to his great discovery, and it is written that Arkwright named his improvement the "Spinning Jenny" by reason of the part which his wife had taken in that great improvement. It was Mrs. Howe who gave to her husband Elias the first design of a sewing machine which would lighten the burdens and work of woman, who from time immemorial had manufactured nearly all the clothing worn by the entire human race.

But I believe that woman is not all cotton. In Hardware I am inclined to classify her as a jobber. One of the most successful jobs, and perhaps the first recorded mention of the use of Hardware in history, is the Tenpenny Nail which Jael, the wife of Heber, the Kenite, drove into the head of the Israelitish captain, her nation's enemy. I believe that women have handled Pokers successfully. I have read of one woman who handled a Poker in earnest because her husband made poker a pastime. The mark of the instrument was said to have been decidedly apparent when the divorce case was tried. It was an excellent illustration to the court of the great value of special brands.

Sentiment enters into all of woman's handiwork. Without sentiment woman is as cold and unresponsive as a bundle of Nail Rods. Three young women in Fairfax County in Old Virginia designed and made the first three bonny blue flags, models of those which for four years floated over these beautiful Southern States, and I am prepared to say that they were followed by as brave men as ever trod to the time of martial music. A beautiful flag was floating over your city to-day. A woman in the State of New York, and chiefly from her own garments, made the first of these flags, on which are the stars and stripes, and to victory it led the Americans against the British and Indians at Oriskany. It is still on the breezes to protect your commerce round the globe. In short, woman makes the roses bloom, in the forge's dust and cinders and in the tissues of the loom. Her crowning work is the home, and here, as has been well said, "The hand that rocks the cradle rules the world." A home without a woman is like a Hardware house without a buyer. There is nothing in either in which any one, especially a manufacturer, would be especially interested.

## UNSATISFACTORY SOCIAL AND INDUSTRIAL CONDITIONS.

I am asked briefly to refer to our relations with the South and its increasing industries. Rather than speak of the products of Georgia, Alabama, or any other State or town, as we all are Americans, it would seem more fitting simply to state that the products of the manufacturing of the United States for the last fiscal year were more than thirteen billions and fourteen millions of dollars. Although these flattering figures represent a vast sum, distributed chiefly to labor, nevertheless, conditions, social and industrial, in the South and in the North are not altogether satisfactory. Peace and order are sometimes threatened; respect for local authority at times is wanting. Thousands have been welcomed to participate in our country's opportunities, which they find to have been already developed by great men who have laid deep the foundations of our national prosperity. Some of these newcomers claim to be Socialists, and they argue well the principles of public or common ownership, of liberty, equality, fraternity and the universal brotherhood of man. But the right to work as one pleases and the universality of their brotherhood seems but an empty theory when the scope of their brotherhood is limited to their own narrow guild barring our American sons from freely entering the trades. Beneath the substratum of American activities, like the electric currents through the cables beneath the deep, deep sea, is the ever active, living desire for right and justice to all men. And this condition existed before these new reformers were born.

What are our relations to the South? They are absolutely mutual. The same flag which to-day protects your mariners in the turbulent seas of the far away Orient and in foreign ports where great nations are engaged in deadly strife, and which protected your citizens in the capital city in the very heart of the great Chinese Empire from the Boxer invaders, should certainly protect your homes and your industries in these States when local authorities fail to do so. And they should protect every working man and woman in their right to earn their bread in any lawful way, regardless of race, creed or affiliation with any organization. An honest workingman, whether he works with the head or with the hand, is one of God's noblest creations; but the hands that on the public street will strip the garments from an innocent, unprotected girl because, physically unable to walk the many miles necessary to reach the little school where she earns her decent livelihood, she rides on a boycotted car, or the hands that will assault a woman anywhere are the hands of miserable cowards. The mob which in the sacred name of Labor will, with rude violence, snatch the helpless widow from the funeral carriage and stop the last sad rites in memory of that earthly protector which she and her little ones hold most dear, because some liveryman is unfair, is led by ruthless tyrants, unworthy the leadership of American workingmen. The local governments which tolerated these crimes are either incompetent or corrupt. When the United States mails were stopped in Chicago, and interstate commerce was threatened, the wholesale destruction of private property and the

assaults on individuals were promptly checked when our flag, borne by United States troops, was sent to the scene of disturbance by Grover Cleveland.

The distinguished Sam Houston of Texas, in explaining our relations to the South and to other parts of the country, and the protection of that flag, once said: "So long as that proud emblem shall wave, so long shall it cast its sacred protection over the personal rights of every American citizen."

We, therefore, hope that in the spirit of peace this protection may be continued when needed, and be transmitted, unimpaired, from one generation to another, until discord shall rend the spheres, the grand march of time shall cease, and not one vestige of all creation remain to chafe on the bosom of eternity's waves.

## FILIPINO COMMISSIONERS VISIT BRIDGEPORT.

THE manufacturers of Bridgeport, Conn., entertained the Honorary Board of Filipino Commissioners to the Louisiana Purchase Exposition, Saturday and Sunday, 18th and 19th inst., the whole city doing its best to give to its guests an adequate idea of the industrial resources of the community and also a wholesome impression of New England hospitality. An important feature of the visit was an exposition of the manufactured products of Bridgeport's factories. The exhibitors had scant notice of this, but in the time between Monday, 13th, and Saturday they got together an exposition worthy of their enterprise, and one which gave their guests an excellent idea of what Bridgeport means in the industrial world. The whole affair was arranged by the Bridgeport Board of Trade, under the immediate direction of President Fred. Enos.

The commissioners arrived in the early forenoon on Saturday and were greeted by a salute of 21 guns. Their hosts were in waiting with automobiles and they proceeded at once to the factories at the east end of the city, which were inspected in groups so far as the time permitted. After the city's fire department had been called out to show the visitors how the Americans conduct their fire protection system, and after a photograph of the group had been taken, lunch was served at the Atlantic Hotel, where the party was quartered during their stay. The early afternoon was given over to an automobile trip among the west end factories, and from 4 to 6 o'clock the time was devoted to the exposition in the Public Library Building, where two large halls were filled with artistically arranged displays of manufactured products, and in several instances of products in their various stages from the raw material to the finely finished article.

The exposition also had the reception feature, business men of the city being given the opportunity to meet their guests from the Philippines. At 8 o'clock a banquet was given at the Atlantic Hotel in honor of the commissioners. The speakers were President Fred. Enos, Governor Chamberlain of Connecticut, Mayor Denis Mulvihill, Hon. A. W. Ferguson, executive secretary of the Philippine Islands, who had the party in charge; Col. J. S. Pettit, Capt. J. R. M. Taylor, President Arthur T. Hadley of Yale University, Congressman N. D. Sperry, Major J. Biddle Porter, Congressman E. Stevens Henry and Congressman E. J. Hill. On Sunday the visitors passed a quiet day, attending church in the morning and enjoying a drive in the suburbs in the afternoon. Each visitor was given a silver medal, containing the seal of the Bridgeport Board of Trade on one side and an appropriate inscription commemorating the visit on the reverse side. The same design in bronze was the badge of the Reception Committee. All expressed themselves as delighted with their visit to Bridgeport and with the enterprise shown among the city's manufacturers.

The exposition of Bridgeport's manufactured products deserves more than a passing mention. Many of the individual exhibits were very fine, and the large variety of product called for frequent comment and commendation by the Filipinos. Among the exhibitors were the Ameri-

can Tube & Stamping Company, who showed their products from the bundle of scrap, ore and limestone ready for the open hearth furnace to a line of finished articles, such as Stove Legs, Lamps and Oilers. The Bridgeport Brass Company's exhibit included Copper and Bronze Tubing, Sheet Brass and Brass Molding, a line of Brass and Copper Wire and numerous finished articles, such as Oilers, Bells, Traps, Lamps and their Fixtures and Torches. The Harvey Hubbell Company had a display of Electric Lighting Specialties, and a Tapping and Centering machine and a Riveting Machine; the Ives Mfg. Company an alluring layout of Toy Railroad, the David B. Crockett Company a line of Varnishes, the Holmes & Edwards Silver Company some handsome Silver Ware and the Bridgeport Hardware Crucible Company a large display of Crucibles for various purposes.

The Automatic Machine Company and the Bridgeport Machine & Motor Company showed Marine Gasoline Engines; the Ashcroft Mfg. Company Steam Gauges, Pipe Dies and Ratchets; the N. Palmer Company Leather Belting in considerable variety and the Schulte Company of Fairfield a line of Wrought Iron Work. The exhibit of the American and British Mfg. Company consisted mostly of Ordnance, and near by was the large and attractive display of the Union Metallic Cartridge Company. The Wheeler & Wilson Sewing Machine Company showed their various Sewing Machines, and the American Graphophone Company had a large display which discussed during the presence of the visitors.

Eaton Cole & Burnham Company's exhibit was a large one, including a large line of Steam and Water Fittings and Hydrants. The Coulter & McKenzie Company showed several Automatic Machines and a Press, and a great variety of products of automatics built by the company, also photographs of Presses. The Bridgeport Chain Company's exhibit consisted of a large variety of their product. The Bridgeport Hardware Mfg. Company's lines of Small Tools, including Shears, Nail Pullers, Screw Drivers, Punches and Nippers, were well displayed.

The Smith & Egge Mfg. Company had a large exhibit of Chains, Belt Punches, Window Pulleys, Machinists' Tools, Padlocks, Handcuffs and their Toy Sewing Machine, all set out against a violet background. The Bulard Machine Company's big Boring Mills were shown in photographs; the Paine Metallic Packing Company and Bridgeport Metallic Packing Company had attractive displays; Jennings Bros. had a line of Fancy Gilt Goods, including Clocks; William Stiffe showed the Berkshire Motor Cycle; the Nonparell Mfg. Company had a display of Insulating and Covering for steam and hot water pipes; the H. O. Canfield Company showed Mechanical Rubber Goods, the Bryant Electric Company a line of Electrical Goods, the Columbia Nut & Bolt Company a full line of their Patent Nut, the E. H. Smith Silver Company a line of Silver Ware, the Pacific Iron Works had a giant Cast Iron Propeller, and the H. H. Sprague company their Gas Meters. The Armstrong Mfg. Company showed their Stocks and Dies, Pipe Cutters, Vises and a Threading Machine.

The Hurwood Mfg. Company exhibited their line of Nippers, Screw Drivers and other Small Tools. The G. Drouve Company showed samples of their Skylight Ventilators and the Lovell Window and Shutter Operating Device. The Springfield Mfg. Company had a line of Grinders and Emery Wheels, and the White Mfg. Company a line of Carriage Lamps. In addition there were displays by manufacturers of textile goods.

THE WARREN AXE & TOOL COMPANY, Warren, Pa., have nearly completed the erection of an addition to their present factory to be used for the manufacture of Scythes and a complete line of High Grade Lumbermen's Tools, including Peavies, Cant Hooks, Bark Spuds, Log Grabs, Saw Wedges, Carting Grabs, Trallars, Swivels and other labor saving Lumbermen's Tools. This company employ steadily 100 skilled mechanics and have a daily capacity of 1500 Axes. They are the sole owners of the Sager patent chemical process for tempering Axes and Tools.



### Universal Coffee Mills.

Landers, Frary & Clark, New Britain, Conn., have recently placed on the market the coffee mills herewith illustrated. The mills are made of sheet steel throughout,

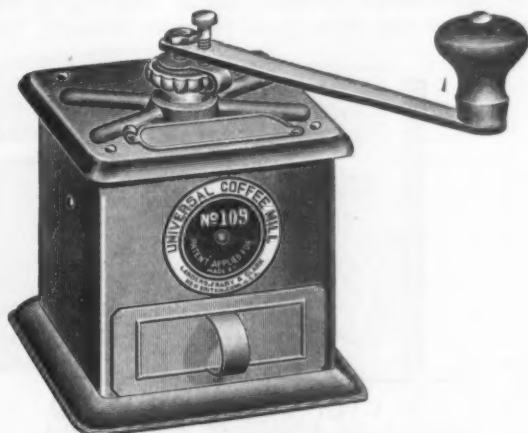


Fig. 1.—Universal Coffee Mill No. 109.

iron, and are warranted equal to steel by the manufacturers. They are of a new design, and their superiority is emphasized by the makers. The No. 109 will grind as much coffee as No. 110, while the No. 110 is made large so that the canister will hold 1 pound of coffee. The adjustment of the mills is effected by loosening the nut that comes up through the handle and then turning the nickel plated nut to the right to loosen it, to the left to tighten black enamel finish, and nicely ornamented. They are strong and made in a durable manner. The grinders are the same in both mills, are made of chilled malleable iron. When it is in the desired position it is held in place by screwing down the nut which goes through the handle.



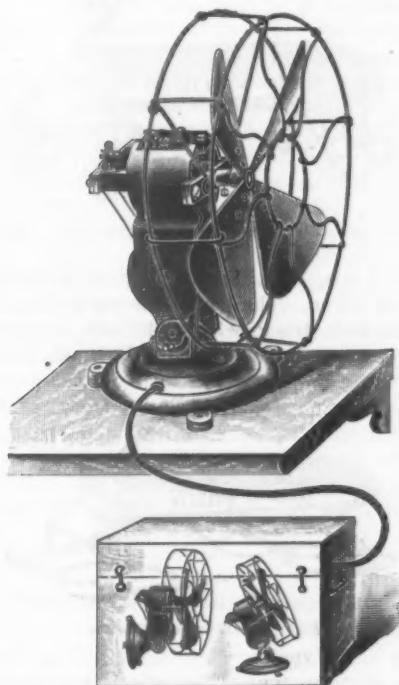
Fig. 2.—Universal Coffee Mill No. 110.

In this way a very positive and effective adjustment is obtained, which, it is remarked, cannot possibly vary after it has once been set.

### The Kenco Electric Fan No. 8.

The fan and attachment herewith illustrated, taking current from portable batteries and easily moved as occasion requires, is designed for use where the street current is not available. The field is formed from electrical steel punchings, and the armature is drum type, six slots. The brushes are readily adjusted while the motor is running, and oil cups with automatic feed keep the motor lubricated. It is mounted on an iron base fitted with a starting switch and rubber feet, and is finished in black enamel with nickel plated trimmings. The fan throws a breeze directly forward, or can be tilted to an angle, either up or down, or can be made into a wall bracket fan, as shown by the two pictures on the box, by adjusting the wing nuts at the lower side of the field.

It is explained that with 20 cells,  $6 \times 2\frac{1}{2}$ , connected five in each series, four multiples, the motor takes so small a fraction of an ampere from each as to enable the battery to stand up to the work; also, that it will run 200 to 300 hours, if used three or four hours per day. If worked continually, not allowing the battery to recuperate, the length of life will, of course, be reduced. The box is wired complete, has a switch to open the multiple

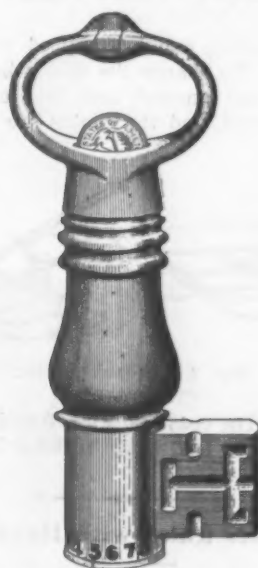


The Kenco Electric Fan No. 8.

connections, and a diagram is furnished showing how to put in the cells and connect. The fan is offered by the Knapp Electric & Novelty Company, 511-513 West Fifty-first street, New York.

### The Key Toy Bank.

The Wilmer Novelty Mfg. Company, Leonard and Winter streets, Cleveland, Ohio, are placing on the market a novel toy bank made in the form of a key, as shown by accompanying cut. It is made of cast iron, handsomely plated in either gilt or oxidized copper, has a combination lock, and is so constructed that the coins



The Key Toy Bank.

cannot be shaken out of the opening made to receive them. The combination is keyed on the figures at the bottom of the bank, and can only be opened by turning the disk as instructed. The banks are made with assorted combinations, and are packed in individual cartons with directions for opening printed on the carton.

### The Big Four Combination.

The accompanying illustrations show the different combinations that can be made with one toy wagon and a set of runners, manufactured by the White Wagon Works,



Fig. 1.—Summer Express.

Sheboygan Falls, Wis., and catalogued by them the Big Four Combination. The wagon shown in Fig. 1 is made extra large and strong, with white ash springboard bottom. The express box is made of black ash, and is of the



Fig. 2.—Winter Express.

removable skeleton type. The wheels are provided with iron hubs, rock maple spokes, rock elm felloes bent in one piece, steel tires welded and shrunk on. The wagon has malleable iron hounds, rock maple pole, iron fifth wheel, king bolt, accurate steering mechanism, iron braces on

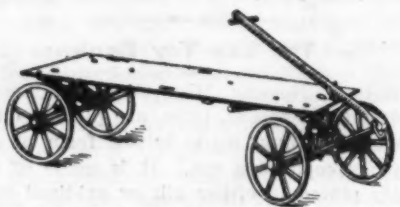


Fig. 3.—Summer Coaster.

front and rear axles, and is equipped with combination lever foot brake. To change the wagon into a sleigh, Fig. 2, the wheels are removed and the four runners are placed on the axles, and the chains are attached in the

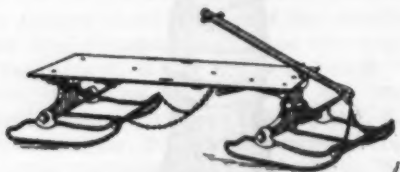


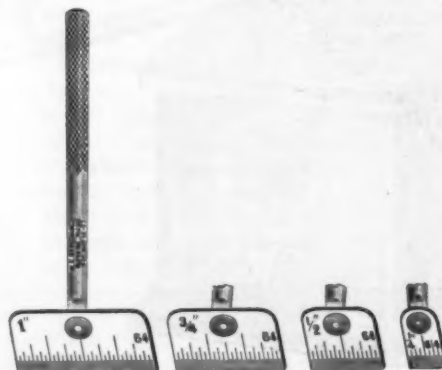
Fig. 4.—Winter Coaster.

proper manner. The coasters, Figs. 3 and 4, are made by removing the wagon box, which requires but a moment to do.

### Steel Rules with Handle.

W. E. Severance, Revere, Mass., is offering the handled rules shown herewith. They have tempered blades, which are held by friction at any angle. The knurled handle makes them very convenient, as they can be held steadily in the hand, and by placing at an angle may be used in many places where it is impossible to get with the end graduations of an ordinary rule. The rules are handy in setting up screw machines, in milling machine work, in

lathe work where there are grooves and short shoulders to be turned, and many times the tall stock center is in the way in measuring small work. They are especially valuable in tool and die making, it is explained; in fact, in all kinds of machine work, large and small, there are many places where the rules can be used to advantage. The back corners of the scale blade are rounded, which



Steel Rules with Handle.

permits it to be moved with the thumb while holding in the hand. In addition to the sizes shown in the illustrations the rules are made in  $\frac{3}{8}$  inch, and are graduated with 100, 64, 50, 32, 20 and 16 lines to the inch.

### The Foss Lengthening Attachment for Bits.

The device for lengthening bits shown herewith consists of a screw threaded rod, the outer end of which is split to form jaws capable of closing about any ordinary bit; a sleeve having a tapering channel which slides on the rod and slips over the jaws to close the same, and a nut below which operates the sleeve and holds the jaws in position. The opposite end is squared to fit the stock of a brace. The standard lengths of the attachment are 16, 20, 24 and 30 inches. The manufacturer remarks that it is often necessary to bore holes through partitions, tim-



The Foss Lengthening Attachment for Bits.

bers and places where a long hole is required and no bit of special length is available for this purpose. The device obviates the necessity of splicing bits in ordinary cases, being constructed small enough to enter the hole made by bits  $\frac{5}{8}$ -inch in diameter and larger. Its length makes it available in a large percentage of cases where it would be necessary to use a ratchet. The illustration shows the attachment, a bit, and the bit lengthened by the attachment. The device is offered by Benj. F. Foss, Fairfield, Maine.

Geo. D. Parmele has disposed of his Hardware business at Rochester, Minn., to George H. Hall and Oscar V. Hanson, who will continue under the style of Hall & Hanson. Mr. Parmele retires after an active experience of 35 years, during 18 of which he has been in business under his own name.

Jones & Tudor, Van Wert, Ohio, have been succeeded by Jones & Tudor Company, comprising W. B. Jones, I. R. Tudor and Homer Gilliland. The firm are wholesale and retail dealers in Hardware, Stoves, Tinware, Paints, Building Material, &c., and their business now extends beyond their county and even State. They give special attention to mail orders and are doing a constantly increasing trade in this direction.



### The Noiseless House Door Hanger No. 222.

The Wilcox Mfg. Company, Aurora, Ill., are placing on the market a new type of house door hanger, which they call the Rob Roy, No. 222, shown in the accompanying illustration. The hanger runs in a tubular track on

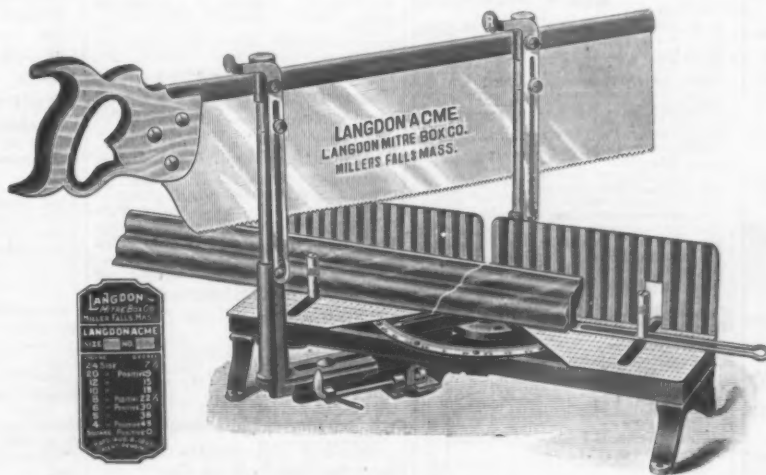


The Noiseless House Door Hanger No. 222.

wooden shoes or runways, making it noiseless. Both the hanger and the track are adjustable vertically and laterally. The fact that the track is covered makes it practically dust proof. The hanger is made for single doors ranging from 2½ to 8 feet, and double doors from 4 to 10 feet openings.

### Langdon Acme Miter Box.

The Millers Falls Company, Millers Falls, Mass., and 28 Warren street, New York, have just put on the market the Langdon Acme miter box, here illustrated. The cut herewith reproduces the size No. 2 miter box with saw suspended by the elevators, the molding held by the supporting guide on one side and brought against the length gauge on the other. In the improved form of Langdon miter box here shown the guides are made an inch longer than heretofore, thus holding the saw steadier when raised to the highest point. The guides



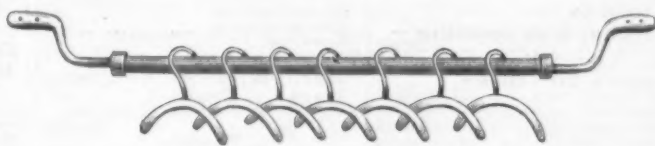
Langdon Acme Miter Box.

are also provided with an elevator, so that the saw is held stationary above the work when desired, as here represented. Besides the notches for the positive angles ordinarily used, the Acme miter box has a graduated arc in front with each degree indicated plainly, so that any possible miter can be cut according to the will of the user, the saw being instantly secured at any deter-

mined point by the pressure of a small thumb lever in front of box. There are supporting guides for holding work rigidly in place, the guides being used also where angles more acute than 45 degrees are desired. Other improvements on the box so long made by this company are an appliance for quicker adjustment of extension lever, a length gauge for duplicate lengths, steel platform roughened to prevent work slipping, and a metallic index plate with degrees attached to the machine. The polished parts are nicked. The boxes are made in three sizes—viz., No. 1, with a solid swinging lever which cannot be extended, and carries a saw 4 inches wide under the back; size 2, provided with an extension lever, by means of which the front part can be extended to give greater width, carrying a saw of the same width as the No. 1, and size 2½, also having an extension lever by which the front post can be extended to give greater width, carrying a saw 5 inches wide under back. The metal scale shown in the lower left corner of the cut is circular in form and fastened to the front post so as to be always available. The saws packed with these miter boxes are made especially for this style of box by Henry Disston & Sons, and are suitable in length and width to accomplish the best results, ranging in length from 22 to 30 inches, inclusive, by multiples of 2 inches, and 4 inches wide to 26 inches, inclusive, the 28 and 30 inch lengths being 5 inches wide. The capacity of boxes at miter are from 5 to 7 inches, and capacity at right angles ranges from 7½ to 10¼ inches, inclusive, according to size of box.

### Perfect Extension Clothes Rod.

The Perfect Extension Rod Company, 568 Broadway, New York, are offering the Perfect Extension clothes



Perfect Extension Clothes Rod.

rod, here illustrated. It is designed particularly for fastening to the under side of closet shelf, from which to suspend suits of clothing hung on clothes hangers to preserve their form, but is also a handy article used as a window bar or towel rack. It is adjustable on both ends, the curved rods, 5-16 inch diameter, telescoping into

the 7-16 inch center rod, which turns freely on the smaller arms, the figures given being outer dimensions. The rods and tubing are of steel, polished and nicked, and there is an available hanging space of from 23 to 45 inches, the extreme length over all being about 50 inches. With this device from 12 to 24 hangers can be supported, it is said, according to the clothing on the hangers.

# Current Hardware Prices.

REVISED JUNE 21, 1904

**General Goods.**—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

**Special Goods.**—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

**Range of Prices.**—A range of prices is indicated by means of the symbol @. Thus 33 1/2 @ 33 1/2 & 10% signifies that the

price of the goods in question ranges from 33 1/2 per cent. discount to 33 1/2, and 10 per cent. discount.

**Names of Manufacturers.**—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1904, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

**Standard Lists.**—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

**Additions and Corrections.**—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

## Abrasives—

Adamite in Carloads: \$ ton \$90@100  
Crystal: \$ ton \$120@140  
Grain: \$ ton \$120@140  
See also Emery.

## Adjusters, Blind—

Domestic, 1/2 doz. \$3.00.....33 1/2  
North's.....10%  
Zimmerman's—See Fasteners, Blind.

## Window Stop—

Ives' Patent.....25%  
Taplin's Perfection.....25%

## Ammunition—See Caps, Cartridges, Shells, &c.

## Anvils—American—

Armad Hammer, Wrought \$8.50@9.50  
Eagle Anvil.....\$ 7.50@7.75  
Hay-Budden, Wrought.....\$ 9.40  
Horseshoe brand, Wrought.....\$ 9.40  
Trenton.....\$ 9.00@9.40

## Imported—

Peter Wright & Sons.....\$ 10.00

## Anvil, Vise and Drill—

Millers Falls Co., \$15.00.....15@10%

## Apple Parers—See Parers, Apple, &c.

## Aprons, Blacksmiths—

Hull Bros. & Co.....\$ 3.25  
Livingston Nail Co.....\$ 3.25

## Augers and Bits—

Com. double spur.....75@75c  
Boring Machine Augers.....65@70%  
Car Bits, 12-in. twist.....60@60c  
Jennings' Pattern.....50@10c  
Ford's Auger and Car Bits.....40c  
Foster's Pat. Auger Bits.....30c  
C. E. Jennings & Co., R. Jennings' list 25c@10%  
No. 30, R. Jennings' list 40c@7%  
Russell Jennings.....25@10c  
L'Hommedieu Car Bits.....15c@10%  
Mayhew's Countersink Bits.....45%  
Miller's Falls.....50@10c  
Ohio Tool Co.'s Auger and Car Bits.....40c  
Pugh's Black.....30%  
Pugh's Jennings' Pattern.....35%  
Snell's Auger Bits.....60%  
Snell's Bell Hangers' Bits.....60c@10%  
Snell's Car Bits, 12-in. twist.....60%  
Wright's Jennings Bits (R. Jennings list).....50%

## Bit Stock Drills—

See Drills, Twist.

## Expansive Bits—

Clark's small, 1/2; large, 3/8.....50@10%  
Clark's Pattern, No. 1, 1/2 doz.....\$ 2.00  
No. 2, 1/2 doz.....50@10%  
Ford's, Clark's Pattern.....50@10%  
C. E. Jennings & Co., Steer's Pat.....25@10%  
Swan's.....60%

## Gimlet Bits—

Common Double Cut, gro. \$3.00@3.25

German Pattern.....gro. \$4.50@4.75

## Hollow Augers—

Bonney Pattern, per doz. \$10.00@11.00  
Ames.....25@10%  
New Patent.....25@10%  
Universal.....20%  
Wood's Universal.....25%

## Ship Augers and Bits—

Ford's.....40%  
C. E. Jennings & Co., L'Hommedieu's.....15c@10%  
Watrous.....30c@10%  
Ohio Tool Co.'s.....40%  
Snell's.....40%

## Awl Hafts, See Hafts, Awl.

## Awls—

Brad Awls:  
Handled.....gro. \$2.75@3.00  
Unhandled, Shouldered, gro. \$3.00@3.25  
Unhandled, Patent, gro. \$3.00@3.25  
Peg Awls:  
Unhandled, Patent.....gro. \$1.00@1.25  
Unhandled, Shouldered, gro. \$1.00@1.25  
Scratch Awls:  
Handled, Common.....gro. \$3.50@4.00  
Handled, Socket.....gro. \$11.50@12.00  
Hurwood.....40%

## Awl and Tool Sets—See Sets, Awl and Tool.

## Axes—

First Quality.....\$5.50@6.00  
Second Quality.....\$4.75@5.25  
Axle Grease—See Grease, Axle

## Axles—

Concord, Loose Collar.....50@54c  
Concord, Solid Collar.....60@54c  
No. 1 Common.....60@54c  
No. 1 1/2 Com. New Style.....50@54c  
No. 2 Solid Collar.....50@54c  
Nos. 7, 8, 11 and 12.....60@50c  
Nos. 13 to 15.....60@50c  
Nos. 15 to 18.....60@10c  
Nos. 19 to 22.....60@10c

## Boxes, Axle—

Common and Concord, not turned.....B. 1/4@1/4c  
Common and Concord, turned.....B. 1/4@1/4c

## Half Patent.....B. 1/4@1/4c

## Bait— Fishing—

Heavy:  
A Bait.....30%  
B Bait.....25%  
Competitor Bait.....30c

## Balances— Sash—

Caldwell new list.....50%  
Foolman's.....60%

## Spring—

Spring Balances.....60@60c

Chatillon's:  
Light Spg. Balances.....40@10%  
Straight Balances.....40%  
Circular Balances.....50%  
Large Dial.....30%  
Relouzeau.....60%

## Barb Wire—See Wire, Barb.

## Bars— Crow—

Steel Crowbars, 10 to 40 lb., per lb. 3@34c

## Towel—

No. 10 Ideal, Nickel Plate.....\$ gro. \$8.50

## Beams, Scale—

Seale Beams, List Jan. 11, '83, 10c@10%

Chatillon's No. 1.....30%  
Chatillon's No. 2.....40%

## Beaters— Carpet—

Holt-Lyon Co.:  
No. 12 Wire Coppered \$ doz \$0.25  
Tinned.....\$1.00  
No. 11 Wire Coppered \$ doz \$1.10  
Tinned.....\$1.20  
No. 10 Wire Galvanized.....\$ doz \$1.75  
Western W. G. Co.:  
No. 1 Electric.....\$ doz \$7.50  
No. 2 Buffalo.....\$ doz \$9.00  
No. 3 Perfection Dust.....\$ doz \$8.00

## Egg—

Holt-Lyon Co.:  
Holt, No. A, Japanned.....\$ doz \$1.20  
Holt, No. 1, Tinned.....\$ doz \$1.50  
Holt, No. B, Japanned.....\$ doz \$2.00  
Holt, No. 2, Tinned.....\$ doz \$2.25  
Lyon, No. 3, Japanned.....\$ doz \$1.25  
Lyon, No. 3, Japanned.....\$ doz \$1.50  
Lighting Chain, \$ gro. \$15.00  
National Mfg. Co.:  
No. 1 Dover, Family size.....\$7.00  
No. 2 Dover, Hotel size.....\$14.00  
Taplin Mfg. Co.:  
No. 68 Improved Dover.....\$8.00  
No. 75 Improved Dover.....\$8.50  
No. 100 Improved Dover.....\$9.00  
No. 102 Improved Dover, Tin'd.....\$8.50  
No. 150 Improved Dover, Hotel.....\$15.00  
No. 152 Imp'd Dover, Hotel, Tin'd.....\$17.00  
No. 200 Imp'd Dover Tumbler.....\$8.50  
No. 300 Imp'd Dover Tumbler, Tin'd.....\$9.50  
No. 300, Imp'd Dover Mammoth.....\$9.00  
Western W. G. Co., Buffalo.....\$25.00  
Wonder (S. S. & Co.).....\$ gro. net, \$20.00

## Bellows—

Blacksmith, Standard List, 75@75c

## Blacksmiths—

Inch.....30 33 35 38 40  
Each \$3.50 3.75 4.25 4.50 5.35 6.15

Extra Length:  
Each \$4.00 4.55 5.10 5.60 6.40 7.50

## Molders—

Inch.....10 12 14  
Doz.....\$3.50 4.00 13.00

## Hand—

Inch.....6 7 8 9 10  
Doz.....\$4.25 4.50 5.00 6.50 7.75

## Bells— Cow—

Ordinary goods.....75c@75c

High grade.....75c@10c

Jersey.....75c@10c

Texas Star.....50%

## Door—

Abbe's Gong.....45%

Barton Gong.....55%

Home, R. & E. Mfg. Co.'s.....55c@10%

Levy and Full, Sargent's.....60c@10%

Yankee Gong.....35%

## Hand—

Hand Bells, Polished, Brass.....60c@60c

White Metal.....60c@60c

Nickel Plated.....50@50c

Silver.....60@60c

Cone's Globe Hand Bells.....80c@80c

Silver Chime.....80c@80c

## Miscellaneous—

Farm Bells.....lb. \$1.40@1.75

Steel Alloy Church and School.....50c@50c

American Tube & Stamp'g Co. Gongs.....75%

Table Call Bells.....50c@50c

Trip Gong Bells.....55c@60c

## Belting— Rubber—

Agricultural (Low Grade).....75@75c

Common Standard.....70@70c

Standard.....65@70c

Extra.....60c@60c

High Grade.....50c@50c

## Leather—

Extra Heavy, Short Lap.....60@60c

Regular Short Lap.....60c@10c

Standard.....70@70c

Light Standard.....70c@10c

Cut Leather Lacing.....60c@10c

Leather Lacing Sides, per sq. ft. 15c

## Bench Stops—See Stops, Bench

## Benders and Upsetters, Tire—

Detroit Perfected Tire Bender.....40%

Green River Tire Benders and Upsetters.....30%

Detroit Lightning Tire Upsetters, No. 1, \$4.25; No. 2, \$7.25; No. 3, \$10.50; No. 4, \$16.25; No. 5, \$30.50.

## Bicycle Goods—

John S. Lang's Son's 1903 list:  
Parts.....50%  
Spokes.....50%  
Tubes.....60%

## Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See Augers and Bits.

## Blocks— Tackle—

Common Wooden.....70c@10c

Hollow Steel Blocks, with Ford's Patent Sheaves.....50c@10%

Junior's Patent Automatic Lock and Junior.....30%

Stowell's Novelty, Mal. Iron.....50c@10%

Stowell's Self Loading.....60%

See also Machines, Hoisting.

## Boards, Stove—

Zinc, Crystal, &c.....30c@10c

## Boils—

Carriage, Machine, &c.—

Common Carriage.....75@75c

Phila. Eagle, \$3.00 list May 24, '99.....80c@10%

Bolt Ends, list Feb. 14, '95.....75@75c

Machine.....75@75c

Machine with C. & T. Nuts.....70c@70c

## Door and Shutter—

Cast Iron Barrel, Round Brass Knob:  
Inch.....\$ 4 5 6 8  
Per doz.....\$0.26 30 39 47 65

Cast Iron Spring Foot:  
Inch.....6 8 10  
Per doz.....\$1.00 1.25 1.75

Cast Iron Chain, Flat, Japanned:  
Inch.....6 8 10  
Per doz.....\$0.75 1.05 1.30

Cast Iron Shutter, Brass Knobs:  
Inch.....6 8 10  
Per doz.....\$0.57 80 1.00

Wrt Barrel, Jap'd, 75c@10c

Wrought.....Bronzed, 40c@50c

Wrought Flush, B. K., 50c@10c

Wrought Shutter.....40c@10c

Wrought Square Neck.....60c@50c

Wrought Sunk, Flush.....50c@50c

Ives' Patent Door.....60%

## Stove and Plow—

Pine.....65c@10c

Stove.....30c@30c

## Tire—

Common.....72c@10c

## Norway Iron.....80@80c

American Screw Company:

Norway Phila., list Oct. 16, '94.....80%

Eagle Phila., list Oct. 16, '94.....80%

Bay State, list Dec. 23, '99.....72c@10%

Franklin Moore Co.:  
Norway Phila., list Oct. 16, '94.....80%

Eagle Phila., list Oct. 16, '94.....80%

Kelpse, list Dec. 23, '99.....72c@10%

Russell, Burdell & Ward Bolt & Nut Co.

Empire, list Dec. 23, '99.....72c@10%

Norway Phila., list Oct. '94.....80%

Union Nut Co.:  
Tire Bolts.....72c@10%

## Borers, Tap—

Borers Tap, Ring, with Handle:  
Inch.....1 1/4 1 3/4 2 3/4 3 3/4 4 3/4 5 3/4 6 3/4 7 3/4 8 3/4 9 3/4 10 3/4 11 3/4 12 3/4 14 3/4 16 3/4 18 3/4 20 3/4 22 3/4 24 3/4 26 3/4 28 3/4 30 3/4 32 3/4 34 3/4 36 3/4 38 3/4 40 3/4 42 3/4 44 3/4 46 3/4 48 3/4 50 3/4 52 3/4 54 3/4 56 3/4 58 3/4 60 3/4 62 3/4 64 3/4 66 3/4 68 3/4 70 3/4 72 3/4 74 3/4 76 3/4 78 3/4 80 3/4 82 3/4 84 3/4 86 3/4 88 3/4 90 3/4 92 3/4 94 3/4 96 3/4 98 3/4 100 3/4 102 3/4 104 3/4 106 3/4 108 3/4 110 3/4 112 3/4 114 3/4 116 3/4 118 3/4 120 3/4 122 3/4 124 3/4 126 3/4 128 3/4 130 3/4 132 3/4 134 3/4 136 3/4 138 3/4 140 3/4 142 3/4 144 3/4 146 3/4 148 3/4 150 3/4 152 3/4 154 3/4 156 3/4 158 3/4 160 3/4 162 3/4 164 3/4 166 3/4 168 3/4 170 3/4 172 3/4 174 3/4 176 3/4 178 3/4 180 3/4 182 3/4 184 3/4 186 3/4 188 3/4 190 3/4 192 3/4 194 3/4 196 3/4 198 3/4 200 3/4 202 3/4 204 3/4 206 3/4 208 3/4 210 3/4 212 3/4 214 3/4 216 3/4 218 3/4 220 3/4 222 3/4 224 3/4 226 3/4 228 3/4 230 3/4 232 3/4 234 3/4 236 3/4 238 3/4 240 3/4 242 3/4 244 3/4 246 3/4 248 3/4 250 3/4 252 3/4 254 3/4 256 3/4 258 3/4 260 3/4 262 3/4 264 3/4 266 3/4 268 3/4 270 3/4 272 3/4 274 3/4 276 3/4 278 3/4 280 3/4 282 3/4 284 3/4 286 3/4 288 3/4 290 3/4 292 3/4 294 3/4 296 3/4 298 3/4 300 3/4 302 3/4 304 3/4 306 3/4 308 3/4 310 3/4 312 3/4 314 3/4 316 3/4 318 3/4 320 3/4 322 3/4 324 3/4 326 3/4 328 3/4 330 3/4 332 3/4 334 3/4 336 3/4 338 3/4 340 3/4 342 3/4 344 3/4 346 3/4 348 3/4 350 3/4 352 3/4 354 3/4 356 3/4 358 3/4 360 3/4 362 3/4 364 3/4 366 3/4 368 3/4 370 3/4 372 3/4 374 3/4 376 3/4 378 3/4 380 3/4 382 3/4 384 3/4 386 3/4 388 3/4 390 3/4 392 3/4 394 3/4 396 3/4 398 3/4 400 3/4 402 3/4 404 3/4 406 3/4 408 3/4 410 3/4 412 3/4 414 3/4 416 3/4 418 3/4 420 3/4 422 3/4 424 3/4 426 3/4 428 3/4 430 3/4 432 3/4 434 3/4 436 3/4 438 3/4 440 3/4 442 3/4 444 3/4 446 3/4 448 3/4 450 3/4 452 3/4 454 3/4 456 3/4 458 3/4 460 3/4 462 3/4 464 3/4 466 3/4 468 3/4 470 3/4 472 3/4 474 3/4 476 3/4 478



... ..

**Forks—**

Base Discounts Aug. 1, 1899, list:

|                                   |           |
|-----------------------------------|-----------|
| Hay, 3 line.....                  | 50¢10¢5¢  |
| Boys' & Fish, 3 line.....         | 50¢10¢5¢  |
| Hay & Boys, 3 line.....           | 60¢5¢     |
| Hay & Boys, 4 line.....           | 60¢5¢     |
| Champion Hay.....                 | 60¢5¢     |
| Hay & Header, long 3 line.....    | 60¢       |
| Header, 4 line.....               | 65¢       |
| Barley, 4 & 5 line, Steel.....    | 60¢30¢    |
| Manure, 4 line.....               | 60¢15¢2½¢ |
| Manure, 5 and 6 line.....         | 60¢2½¢    |
| Spading.....                      | 70¢2½¢    |
| Potato Digger, 6 line.....        | 60¢10¢    |
| Sugar Beet.....                   | 40¢10¢    |
| Coke & Coal.....                  | 40¢10¢    |
| Heavy Mill & Street.....          | 65¢       |
| Iowa Dig-Ezy Potato.....          | 60¢10¢    |
| Victor, Hay.....                  | 60¢15¢2½¢ |
| Victor, Manure.....               | 60¢       |
| Victor, Header.....               | 65¢       |
| Champion, Hay.....                | 60¢15¢    |
| Champion Header.....              | 60¢       |
| Champion, Manure.....             | 60¢15¢2½¢ |
| Columbia, Hay.....                | 60¢20¢    |
| Columbia, Manure.....             | 70¢       |
| Columbia, Spading.....            | 70¢12½¢   |
| Hawkeye Wood Barley.....          | 40¢       |
| W. & C. Potato Digger.....        | 60¢15¢    |
| Acme Hay.....                     | 60¢10¢5¢  |
| Acme Manure, 4 line.....          | 60¢30¢7½¢ |
| Dakota Header.....                | 65¢15¢5¢  |
| Jackson Steel Barley.....         | 65¢15¢5¢  |
| Kansas Header.....                | 60¢       |
| W. & C. Favorite Wood Barley..... | 40¢       |

Pinted.—See Spoons.

**Fountains, Stock—**

Double Dewey..... ½ doz. \$13.00

**Frames—Saw—**

White, Straight Bar per doz. 75¢30¢

Red, Straight Bar per doz. \$1.00@1.25

Red, Double Brace per doz. \$1.40@1.50

**Freezers Ice Cream—**

Each..... 1 2 3 4 5 6

Each..... \$1.25 \$1.60 \$1.90 \$2.20 \$2.50

**Fruit and Jelly Presses—**

See Presses, Fruit and Jelly.

**Fry Pans—See Pans, Fry.****Fuse—**

Hemp..... ½ doz. \$2.75

Cotton..... 3.50

Waterproof Single Taped..... 3.65

Waterproof Double Taped..... 4.40

Waterproof Triple Taped..... 4.15

**Gates, Molasses and Oil—**

Stebbins' Pattern..... 80¢10¢@80¢10¢5¢

**Gauges—**

Marking, Mortise, etc..... 50¢10¢5¢@50¢10¢10¢5¢

Chapin-Stephens Co..... 50¢10¢5¢@50¢10¢10¢5¢

Marking, Mortise, etc..... 50¢10¢5¢@50¢10¢10¢5¢

School's Patent..... 50¢10¢5¢@50¢10¢10¢5¢

Door Hangers..... 50¢10¢5¢@50¢10¢10¢5¢

Fulton's Butt Gauge..... 50¢10¢5¢@50¢10¢10¢5¢

Stanley R. &amp; L. Co.'s Butt &amp; Babber Gauge..... 50¢10¢5¢@50¢10¢10¢5¢

Wire, Brown &amp; Sharpe's..... 25¢

Wire, Morse's..... 25¢

Wire P. S. &amp; W. Co..... 30¢10¢

**Climets—Single Cut—**

Nail, Metal, Assorted, gro. \$1.10@1.50

Spike, Metal, Assorted, gro. \$2.80@3.50

Nail, Wood Handled, Assorted, gro. \$1.75@2.00

Spike, Wood Handled, Assorted, gro. \$2.50@4.50

**Glass, American Window—**

See Trade Report.

**Glasses, Level—**

Chapin-Stephens Co..... 60¢@80¢10¢10¢

**Glue—Liquid Fish—**

Bottles or Cans, with Brush..... 25¢@50¢

Cans (½ pt., pt., qts., ½ gal., gal.)..... 25¢@45¢

International Glue Co. (Martin's)..... 40¢10¢50¢

**Groase Axle—**

Common Grade..... gro. \$1.50@5.50

Dixon's Everlasting..... 10¢10¢10¢10¢

Dixon's Everlasting, in bxs. ½ doz. 1 2 3

1 2 3..... \$1.30; 2 3 \$2.00

**Grips, Nipple—**

Perfect Nipple Grips..... 40¢10¢2½¢

**Griddles, Soapstone—**

Pike Mfg. Co..... 33¢@39¢@10¢

**Grindstones—**

Bicycle Emery Grinder..... \$0.50

Bicycle Grindstones, each..... \$2.50@3.00

Pike Mfg. Co..... 50¢2½¢

Improved Family Grindstones..... 35¢

Per inch, per doz..... \$2.00

Pike Mower Knife and Tool..... \$1.00

Velox Ball Bearing, mounted, Angle Iron Frames..... each, \$3.25

**Halters and Ties—**

Covert Mfg. Co..... 40¢2½¢

Web..... 40¢5¢5¢

Sisal Rope..... 50¢

Cotton Rope..... 45¢2½¢

Hemp Rope..... 45¢2½¢

Covert's Saddle Works..... 45¢2½¢

Web and Leather Halters..... 70¢

Jute and Manila Rope Halters..... 70¢

Sisal Rope Halters..... 70¢20¢

Jute, Manila and Cotton Rope Ties..... 70¢

Sisal Rope Ties..... 70¢10¢

**Hammers—**

Handled Hammers—

Heller's Machinist..... 40¢10¢40¢10¢10¢

Heller's Farriers..... 40¢10¢40¢10¢10¢

Magnetic Tack, Nos. 1, 2, 3, \$1.25, \$1.50, \$1.75

40¢10¢10¢10¢

Peck, Stow &amp; Wilcox..... 40¢10¢10¢

Fayette R. Plumb..... 40¢10¢10¢

Plumb, A. E. Nall, \$1.75@3.50@1.75@3.50

Engineers' and B. S. Hand..... 50¢7½¢50¢10¢7½¢5¢

Machinist's Hammers..... 50¢50¢10¢50¢

Riveting and Tinner's..... 40¢2½¢@40¢10¢2½¢

**Sargent's C. S. New List.....40¢****Heavy Hammers and Sledges—**

Under 3 lb..... lb 50¢ } 75¢10¢5

5 to 6 lb..... lb 40¢ } @30¢

Over 5 lb..... lb 30¢ } @30¢

Wilkinson's Smiths..... 2½¢@10¢10¢

**Handles—**

Agricultural Tool Handles—

Axe, Pick, etc..... 45¢50¢5¢

Hoe, Rake, etc..... 45¢50¢5¢

Fork, Shovel, Spade, etc.:..... 45¢50¢5¢

Long Handles..... 45¢50¢5¢

D Handles..... 40¢

**Cross-Cut Saw Handles—**

Atkins..... 40¢5¢

Champion..... 45¢45¢10¢

Dixton's..... 50¢

**Mechanics' Tool Handle—**

Auger, assorted..... gro. \$2.50@3.85

Bradawl..... gro. \$1.65@1.85

Chisel Handles:

Apple Tanged Firmer, gro. ass'd..... \$2.10@2.65

Hickory Tanged Firmer, gro. ass'd..... \$1.15@2.40

Apple Socket Firmer, gro. ass'd..... \$1.75@1.95

Hickory Socket Firmer, gro. ass'd..... \$1.45@1.60

Hickory Socket Framing, gro. ass'd..... \$1.60@1.75

File, assorted..... gro. \$1.30@1.40

Hammer, Hatchet, Axe, etc..... 50¢

Hand Saw, Varnished, doz. 50¢55¢

Not Varnished..... 65¢75¢

Plane Handles:

Jack doz. 30¢; Jack Bolted..... 75¢

Pore, doz..... 45¢; Fore, Bolted 90¢

Chapin-Stephens Co.:..... 40¢40¢10¢

Carving Tool..... 40¢40¢10¢

Chisel..... 65¢65¢10¢

File and Awl..... 65¢65¢10¢

Saw and Plane..... 40¢40¢10¢

Screw Driver..... 40¢40¢10¢

Millers Falls Adj. and Hatchet Auger Handles..... 15¢10¢

Nicholson Simplicity File Handle, ½ gro..... \$0.85@1.30

**Hangers—**

NOTE.—Barn Door Hangers are generally quoted per pair, without track and Parlor Door Hangers per double set with track, etc.

Barn Door, New Pattern, Round Groove, Regular:

Inch..... 3 4 5 6 8

Single Doz. \$0.90 1.25 1.60 1.95 2.50

Barn Door, New England Pattern, Check Back, Regular:

Inch..... 3 4 5 6

Single Doz. \$1.30 1.85 2.50 3.00

Althill Mfg. Co.:..... 40¢40¢10¢

Reliable No. 1..... per doz. \$12.00

Reliable No. 2..... per doz. \$15.00

Chicago Spring Butt Co.:..... 25¢

Friction..... 25¢

Oscillating..... 25¢

Big Twin..... 25¢

Chisholm &amp; Moore Mfg. Co.:..... 50¢

Baggage Car Door..... 50¢

Elevator..... 50¢

Railroad..... 50¢

Cronk &amp; Carrier Mfg. Co.:..... 60¢

Loose Axle..... 60¢

Roller Bearing..... 60¢10¢

Lane Bros. Co.:..... \$4.15

Parlor, Ball Bearing..... \$3.35

Parlor, Standard..... \$3.35

Parlor, New Model..... \$4.25

Parlor, New Champion..... \$2.25

Barn Door, Standard, 50¢10¢10¢5¢

Hinged..... 60¢40¢

Covered..... 50¢10¢10¢

Lawrence Bros.:..... 50¢10¢10¢5¢

Advance..... 60¢

Cleveland..... 60¢10¢

Crown..... 50¢10¢

Grant..... 50¢10¢

New York..... 60¢

Peelers..... 60¢10¢

Sterling..... 60¢

Swing, No. 95..... 60¢

Union, No. 44, \$5.00; No. 45 \$7.00; No. 46, \$9.00.

McKinney Mfg. Co.:..... 60¢10¢

No. 1, Special, \$15..... 60¢10¢

No. 2, Standard, \$15..... 60¢10¢

Hinged Hangers, \$10..... 50¢

Meyers' Station Hangers..... 60¢

C. S. Smith Mfg. Co.:..... 50¢10¢

Lundy Parlor Door..... 50¢10¢

Monarch Barn Door..... 50¢10¢

Never Jump Hinge..... 50¢10¢

Peelers..... 60¢10¢

Perfection..... 70¢5¢

Phoenix..... 70¢5¢

Wagner's Adjustable..... 70¢10¢

Warehouse Anti-Friction..... 60¢

Richards Mfg. Co.:..... \$2.25

Pioneer Wood Track No. 3..... \$2.25

Imp'd Wood Track No. 5..... \$2.25

Imp'd Steel Track No. 7..... \$2.70

Imp'd Steel Track No. 7..... \$2.65

Ball Brg Steel Track No. 9..... \$2.50

Ball Brg Steel Track No. 10..... \$2.50

Ball Brg Steel Track No. 11..... \$2.45

Ball Brg Steel Track No. 12..... \$2.40

Ball Brg Steel Track No. 13..... \$2.75

Ball Brg Steel Track No. 14..... \$2.65

Ball Brg Trolley Track No. 15..... 40¢

Ball Brg Trolley Track No. 19..... 40¢

Ball Bearing Tandem Trolley Track No. 16..... 40¢

Silent Adjustable Track No. 18..... 40¢

Auto Adjustable Track No. 22..... 40¢

Trolley B. D. No. 17..... \$1.60

Trolley F. D. No. 120..... \$2.70

Trolley F. D. No. 121..... \$2.85

Trolley F. D. No. 131..... \$3.00

Roller Bearing D. D. No. 35..... 70¢5

Anti Friction B. D..... 60¢10¢

Ives' Wood Track No. 1..... \$2.15

Ives' Wood Track No. 2..... \$2.15

Safety Door Hanger Co.:..... 60¢

Storm King Safety..... 60¢

U. S. Standard Hinge..... 60¢

Stowell Mfg. and Foundry Co.:..... 40¢

Acme Parlor Ball Bearing..... 40¢

Ajax Hinge Door..... 50¢10¢5¢

Apex Parlor Door..... 50¢10¢5¢

Atlas..... 60¢

**Baggage Car Door.....50¢****Cliff Anti-Friction.....50¢10¢****Elevator.....40¢****Express Car Door.....50¢****Freight Car Door.....50¢****Interstate.....40¢10¢****Lundy Parlor Door.....50¢10¢****Magic.....60¢****Matchless.....60¢10¢****Nashen.....70¢5¢****Parlor Door.....50¢10¢****Railroad.....50¢10¢****Rex Hinge Door.....60¢****Street Car Door.....50¢****Steel, Nos. 300, 404, 500.....50¢10¢****Underwriter's Fire Door.....40¢****Wild West Warehouse Door.....50¢****Zenith 2½ Wood Track.....50¢10¢****A. L. Swett Iron Works:**

Eagle..... 60¢10¢

Hylo..... 50¢10¢

Perfection..... 60¢

Pilot..... 40¢

Taylor &amp; Boggs' P. Y. Co.'s Kiddle's Roller Bearing..... 50¢15¢10¢5¢

Wilcox Mfg. Co.:..... 60¢10¢

Bike Roller Bearing..... 60¢10¢

C. J. Roller Bearing..... 60¢10¢

Cycle Ball Bearing..... 50¢

Dwarf Ball Bearing..... 40¢

Ivory Wood Track..... 60¢10¢

L. T. Roller Bearing..... 50¢10¢5¢

New Era Roller Bearing..... 50¢10¢

O. K. Roller Bearing..... 60¢10¢5¢

Prindle, Wood Track..... 60¢

Richards' Wood Track..... 60¢

Richards' Steel Track..... 50¢10¢

Spencer Roller Bearing..... 60¢10¢

Tandem Nos. 1 and 2..... 60¢

Underwriter's Roller Bearing..... 40¢

Velvet..... 50¢



## Wire Goods Co.

|              |        |
|--------------|--------|
| Acme         | 80¢10¢ |
| Chief        | 70¢    |
| Crown        | 70¢10¢ |
| Czar         | 65¢    |
| V. Brace     | 70¢11¢ |
| Czar Harness | 50¢10¢ |

## Wrought Iron—

|                      |                       |
|----------------------|-----------------------|
| Box, 6 in., per doz. | \$1.00; 3 in. \$1.35; |
| 10 in.               | \$2.50.               |

## Cotton—

|                              |                    |
|------------------------------|--------------------|
| Wrought Staples, Hooks, Etc. | See Wrought Goods. |
|------------------------------|--------------------|

## Miscellaneous—

|                                 |  |
|---------------------------------|--|
| Hooks, Bench, see Staps. Bench. |  |
|---------------------------------|--|

|                   |                                       |
|-------------------|---------------------------------------|
| Bush, Light, doz. | \$5.50; Medium, \$6.00; Heavy, \$6.50 |
|-------------------|---------------------------------------|

|              |       |
|--------------|-------|
| Grass, No. 1 | 1 3 4 |
|--------------|-------|

|      |                   |
|------|-------------------|
| Best | \$1.50 1 7 5 2 00 |
|------|-------------------|

|        |                       |
|--------|-----------------------|
| Common | \$1.30 1 30 1 40 1 60 |
|--------|-----------------------|

|                   |        |
|-------------------|--------|
| Potato and Manure | 60¢15¢ |
|-------------------|--------|

|            |              |
|------------|--------------|
| Wh. Meters | 1b. 5/4 @ 6c |
|------------|--------------|

|                |  |
|----------------|--|
| Hooks and Eyes |  |
|----------------|--|

|       |              |
|-------|--------------|
| Brass | 60¢10¢10¢70¢ |
|-------|--------------|

|                |            |
|----------------|------------|
| Malleable Iron | 70¢@70¢10¢ |
|----------------|------------|

|  |     |
|--|-----|
| Covert Mfg. Co. Gate and Seattle Hooks | 35¢ |
|--|-----|

|                                     |  |
|-------------------------------------|--|
| Covert Saddlery Works' Self Locking |  |
|-------------------------------------|--|

|                     |     |
|---------------------|-----|
| Gate and Door Hooks | 40¢ |
|---------------------|-----|

|                                 |     |
|---------------------------------|-----|
| St. Madison Cut-Down Corn Hooks | 35¢ |
|---------------------------------|-----|

|                              |  |
|------------------------------|--|
| Bench Hooks—See Bench Staps. |  |
|------------------------------|--|

|                              |  |
|------------------------------|--|
| Corn Hooks—See Knives, Corn. |  |
|------------------------------|--|

|                              |  |
|------------------------------|--|
| Horse Nails—See Nails, Horse |  |
|------------------------------|--|

|             |  |
|-------------|--|
| Horseshoes— |  |
|-------------|--|

|                   |  |
|-------------------|--|
| See Shoes, Horse. |  |
|-------------------|--|

|              |  |
|--------------|--|
| Hose Rubber— |  |
|--------------|--|

|                        |  |
|------------------------|--|
| Garden Hose, 3/4-inch: |  |
|------------------------|--|

|             |               |
|-------------|---------------|
| Competition | ft. 4/4 @ 5 c |
|-------------|---------------|

|                |               |
|----------------|---------------|
| 3-ply Standard | ft. 6/4 @ 7 c |
|----------------|---------------|

|                |               |
|----------------|---------------|
| 4-ply Standard | ft. 7/4 @ 8 c |
|----------------|---------------|

|             |               |
|-------------|---------------|
| 3-ply extra | ft. 8/4 @ 9 c |
|-------------|---------------|

|             |                   |
|-------------|-------------------|
| 4-ply extra | ft. 10 @ 10 1/2 c |
|-------------|-------------------|

|                                  |  |
|----------------------------------|--|
| Cotton Garden, 3/4-in., coupled: |  |
|----------------------------------|--|

|           |             |
|-----------|-------------|
| Low Grade | ft. 6 @ 7 c |
|-----------|-------------|

|              |             |
|--------------|-------------|
| Fair quality | ft. 8 @ 9 c |
|--------------|-------------|

|            |  |
|------------|--|
| Irons—Sad— |  |
|------------|--|

|              |               |
|--------------|---------------|
| From 4 to 10 | lb. 3/4 @ 3 c |
|--------------|---------------|

|                 |                   |
|-----------------|-------------------|
| B. B. Sad Irons | lb. 3/4 @ 3 1/2 c |
|-----------------|-------------------|

|                 |                   |
|-----------------|-------------------|
| Chinese Laundry | lb. 1/4 @ 3 1/2 c |
|-----------------|-------------------|

|             |                   |
|-------------|-------------------|
| Chinese Sad | lb. 1/4 @ 4 1/2 c |
|-------------|-------------------|

|                            |  |
|----------------------------|--|
| Mrs. Potts, cents per set: |  |
|----------------------------|--|

|      |             |
|------|-------------|
| Nos. | 50 55 60 65 |
|------|-------------|

|           |                |
|-----------|----------------|
| Jap'd Top | 63 69 73 69 71 |
|-----------|----------------|

|           |             |
|-----------|-------------|
| Tin'd Top | 65 69 73 72 |
|-----------|-------------|

|                           |           |
|---------------------------|-----------|
| New England Pressing, lb. | 3/4 @ 1 c |
|---------------------------|-----------|

|          |  |
|----------|--|
| Pinking— |  |
|----------|--|

|            |  |
|------------|--|
| Soldering— |  |
|------------|--|

|                               |         |
|-------------------------------|---------|
| Soldering Coppers 3/4 and 3/8 | 19¢@20¢ |
|-------------------------------|---------|

|             |         |
|-------------|---------|
| 1/2 and 3/8 | 21¢@22¢ |
|-------------|---------|

|              |  |
|--------------|--|
| Jacks Wagon— |  |
|--------------|--|

|                 |  |
|-----------------|--|
| Covert Mfg. Co. |  |
|-----------------|--|

|            |       |
|------------|-------|
| Auto Screw | 30¢5¢ |
|------------|-------|

|       |  |
|-------|--|
| Steel |  |
|-------|--|

|                          |  |
|--------------------------|--|
| Covert's Saddlery Works: |  |
|--------------------------|--|

|       |        |
|-------|--------|
| Daisy | 40¢10¢ |
|-------|--------|

|        |        |
|--------|--------|
| Victor | 40¢10¢ |
|--------|--------|

|          |     |
|----------|-----|
| Lockport | 50¢ |
|----------|-----|

|              |        |
|--------------|--------|
| Lane's Steel | 30¢10¢ |
|--------------|--------|

|          |  |
|----------|--|
| Kettles— |  |
|----------|--|

|                     |         |
|---------------------|---------|
| Brass, Sprun, Plain | 20¢@25¢ |
|---------------------|---------|

|   |  |
|---|--|
| Enamelled and Cast Iron—See Ware, Hollow. |  |
|---|--|

|         |  |
|---------|--|
| Knives— |  |
|---------|--|

|                        |  |
|------------------------|--|
| Butcher, Kitchen, &c.— |  |
|------------------------|--|

|                            |     |
|----------------------------|-----|
| Foster Bros., Butcher, &c. | 30¢ |
|----------------------------|-----|

|                      |        |
|----------------------|--------|
| Smith & Hemenway Co. | 40¢10¢ |
|----------------------|--------|

|                               |     |
|-------------------------------|-----|
| Wilkinson Shear & Cutlery Co. | 50¢ |
|-------------------------------|-----|

|                               |  |
|-------------------------------|--|
| Hay and Straw—See Hay Knives. |  |
|-------------------------------|--|

|       |  |
|-------|--|
| Corn— |  |
|-------|--|

|                         |  |
|-------------------------|--|
| Withington Acme, 4 doz. | \$2.65; Dent, \$2.75; adj. Serrated, \$2.20; Serrated, \$2.10; Yankee No. 1, \$1.50; Yankee No. 2, \$1.15. |
|-------------------------|--|

|          |  |
|----------|--|
| Drawing— |  |
|----------|--|

|               |                 |
|---------------|-----------------|
| Standard List | 70¢10¢70¢10¢10¢ |
|---------------|-----------------|

|           |     |
|-----------|-----|
| Bradley's | 35¢ |
|-----------|-----|

|                                  |        |
|----------------------------------|--------|
| C. E. Jennings & Co. Nos. 45, 46 | 60¢10¢ |
|----------------------------------|--------|

|  |     |
|--|-----|
| Jennings & Griffin, Nos. 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 | 70¢ |
|--|-----|

|                 |     |
|-----------------|-----|
| Ohio Tool Co.'s | 70¢ |
|-----------------|-----|

|        |        |
|--------|--------|
| Swan's | 70¢10¢ |
|--------|--------|

|         |        |
|---------|--------|
| Watrous | 10¢10¢ |
|---------|--------|

|                  |         |
|------------------|---------|
| L. & J. J. White | 20¢@35¢ |
|------------------|---------|

|                |  |
|----------------|--|
| Hay and Straw— |  |
|----------------|--|

|           |                        |
|-----------|------------------------|
| Lightning | 10¢ doz. \$6.50 @ 7.00 |
|-----------|------------------------|

|                    |                 |
|--------------------|-----------------|
| Iwan's Sickle Edge | 10¢ doz. \$7.00 |
|--------------------|-----------------|

|                 |                  |
|-----------------|------------------|
| Iwan's Serrated | 10¢ doz. \$10.00 |
|-----------------|------------------|

|       |                 |
|-------|-----------------|
| Maine | 10¢ doz. \$5.50 |
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|          |  |
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| Mincing— |  |
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| Buffalo | 10¢ doz. \$13.00 |
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| Miscellaneous— |  |
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|         |                        |
|---------|------------------------|
| Farmers | 10¢ doz. \$3.00 @ 3.55 |
|---------|------------------------|

|              |                        |
|--------------|------------------------|
| Wostenholm's | 10¢ doz. \$3.00 @ 3.25 |
|--------------|------------------------|

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| Knobs— |  |
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|                                 |  |
|---------------------------------|--|
| Base, 3/4-inch, Birch, or Maple |  |
|---------------------------------|--|

|                  |               |
|------------------|---------------|
| Rubber tip, gro. | \$1.10 @ 1.15 |
|------------------|---------------|

|                                |            |
|--------------------------------|------------|
| Carriage, Jap. all sizes, gro. | 10¢ @ 1.50 |
|--------------------------------|------------|

|               |                |
|---------------|----------------|
| Door, Mineral | doz. 65¢ @ 70¢ |
|---------------|----------------|

|                  |                |
|------------------|----------------|
| Door, Por. Jap'd | doz. 70¢ @ 75¢ |
|------------------|----------------|

|                   |                    |
|-------------------|--------------------|
| Door, Por. Nickel | doz. \$2.05 @ 3.15 |
|-------------------|--------------------|

|                                   |     |
|-----------------------------------|-----|
| Hardley's Wood Door, Shutter, &c. | 15¢ |
|-----------------------------------|-----|

|                    |           |
|--------------------|-----------|
| Picture, Sargent's | 60¢10¢10¢ |
|--------------------|-----------|

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|-----------------|--|
| Lacing Leather— |  |
|-----------------|--|

|                      |  |
|----------------------|--|
| See Belting Leather. |  |
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| Ladders, Step Etc.— |  |
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|            |  |
|------------|--|
| See Store. |  |
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|                               |     |
|-------------------------------|-----|
| Myers Noiseless Store Ladders | 30¢ |
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| Ladies—Melting— |  |
|-----------------|--|

|                            |     |
|----------------------------|-----|
| L. & U. Mfg. Co., Low List | 25¢ |
|----------------------------|-----|

|            |     |
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| P. S. & W. | 40¢ |
|------------|-----|

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| Reading | 60¢ |
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| Sargent's | 45¢10¢ |
|-----------|--------|

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|-------------------|--|
| Lanterns—Tubular— |  |
|-------------------|--|

|                             |               |
|-----------------------------|---------------|
| Regular Tubular No. 0, doz. | \$1.35 @ 1.75 |
|-----------------------------|---------------|

|                             |               |
|-----------------------------|---------------|
| 1 1/2" Tubular, No. 0, doz. | \$1.75 @ 2.25 |
|-----------------------------|---------------|

|                           |               |
|---------------------------|---------------|
| Hinge Tubular No. 0, doz. | \$1.75 @ 2.25 |
|---------------------------|---------------|

|              |              |
|--------------|--------------|
| Other Styles | 10¢10¢10¢10¢ |
|--------------|--------------|

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|--------------------|--|
| Bull's Eye Police— |  |
|--------------------|--|

|                 |               |
|-----------------|---------------|
| No. 1, 3/4 inch | \$1.50 @ 2.75 |
|-----------------|---------------|

|               |               |
|---------------|---------------|
| No. 2, 3 inch | \$1.75 @ 3.00 |
|---------------|---------------|

|                        |  |
|------------------------|--|
| Leads and Stands Shoe— |  |
|------------------------|--|

|                                 |     |
|---------------------------------|-----|
| Stowell's Atlas, Malleable Iron | 50¢ |
|---------------------------------|-----|

|                             |     |
|-----------------------------|-----|
| Stowell's Badger, Cast Iron | 50¢ |
|-----------------------------|-----|

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| Latches— |  |
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| Thumb— |  |
|--------|--|

|                              |           |
|------------------------------|-----------|
| Roggin's Latches, with screw | 15¢ @ 40¢ |
|------------------------------|-----------|

|                 |  |
|-----------------|--|
| Leaders Cattle— |  |
|-----------------|--|

|       |                      |
|-------|----------------------|
| Small | doz. 55¢; large, 90¢ |
|-------|----------------------|

## Covert Mfg. Co.

|                   |  |
|-------------------|--|
| Lifters, Transom— |  |
|-------------------|--|

|       |         |
|-------|---------|
| R & E | 33 1/2¢ |
|-------|---------|

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| Lines— |  |
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|                       |       |
|-----------------------|-------|
| Wire Clothes, Nos. 15 | 10 20 |
|-----------------------|-------|

|          |                  |
|----------|------------------|
| 100 feet | \$2.20 2.00 1.65 |
|----------|------------------|

|         |                  |
|---------|------------------|
| 75 feet | \$1.80 1.70 1.30 |
|---------|------------------|

|                       |  |
|-----------------------|--|
| Samson Cordage Works: |  |
|-----------------------|--|

|                                 |     |
|---------------------------------|-----|
| Solid Braided Chalk, No. 0 to 3 | 40¢ |
|---------------------------------|-----|

|   |  |
|---|--|
| Silver Lake Braided Chalk, No. 0, \$1.00; |  |
|---|--|

|   |  |
|---|--|
| No. 1, \$1.50; No. 2, \$2.00; No. 3, \$2.50 |  |
|---|--|

|                                       |     |
|---------------------------------------|-----|
| Masons' Lines, Shade Cord, &c.: White | 20¢ |
|---------------------------------------|-----|

|  |  |
|--|--|
| Cotton, No. 3/4, \$1.50; No. 4, \$2.00; No. 4 1/2, \$2.50; Colors, No. 3/4, \$1.75; No. 4, \$2.25; No. 4 1/2, \$2.75; Lines, No. 3/4, \$2.50; No. 4, \$3.00; No. 4 1/2, \$3.50 |  |
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|                                     |     |
|-------------------------------------|-----|
| Tent and Awning Lines: No. 5, White | 20¢ |
|-------------------------------------|-----|

|   |  |
|---|--|
| Cotton, \$2.50; Drab Cotton, \$3.50; No. 4, \$2.25; White Cotton, 50 ft., \$2.75; 60 ft., \$3.25; 70 ft., \$3.75; 75 ft., \$4.00; 80 ft., \$4.25; 90 ft., \$4.75; 100 ft., \$5.25 |  |
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| Aniston Waterproof Clothes, 50 ft., \$2.00; \$2.50; \$3.00; \$3.50; \$4.00; \$4.50; \$5.00; \$5.50; \$6.00; \$6.50; \$7.00; \$7.50; \$8.00; \$8.50; \$9.00; \$9.50; \$10.00; \$10.50; \$11.00; \$11.50; \$12.00; \$12.50; \$13.00; \$13.50; \$14.00; \$14.50; \$15.00; \$15.50; \$16.00; \$16.50; \$17.00; \$17.50; \$18.00; \$18.50; \$19.00; \$19.50; \$20.00; \$20.50; \$21.00; \$21.50; \$22.00; \$22.50; \$23.00; \$23.50; \$24.00; \$24.50; \$25.00; \$25.50; \$26.00; \$26.50; \$27.00; \$27.50; \$28.00; \$28.50; \$29.00; \$29.50; \$30.00; \$30.50; \$31.00; \$31.50; \$32.00; \$32.50; \$33.00; \$33.50; \$34.00; \$34.50; \$35.00; \$35.50; \$36.00; \$36.50; \$37.00; \$37.50; \$38.00; \$38.50; \$39.00; \$39.50; \$40.00; \$40.50; \$41.00; \$41.50; \$42.00; \$42.50; \$43.00; \$43.50; \$44.00; \$44.50; \$45.00; \$45.50; \$46.00; \$46.50; \$47.00; \$47.50; \$48.00; \$48.50; \$49.00; \$49.50; \$50.00; \$50.50; \$51.00; \$51.50; \$52.00; \$52.50; \$53.00; \$53.50; \$54.00; \$54.50; \$55.00; \$55.50; \$56.00; \$56.50; \$57.00; \$57.50; \$58.00; \$58.50; \$59.00; \$59.50; \$60.00; \$60.50; \$61.00; \$61.50; \$62.00; \$62.50; \$63.00; \$63.50; \$64.00; \$64.50; \$65.00; \$65.50; \$66.00; \$66.50; \$67.00; \$67.50; \$68.00; \$68.50; \$69.00; \$69.50; \$70.00; \$70.50; \$71.00; \$71.50; \$72.00; \$72.50; \$73.00; \$73.50; \$74.00; \$74.50; \$75.00; \$75.50; \$76.00; \$76.50; \$77.00; \$77.50; \$78.00; \$78.50; \$79.00; \$79.50; \$80.00; \$80.50; \$81.00; \$81.50; \$82.00; \$82.50; \$83.00; \$83.50; \$84.00; \$84.50; \$85.00; \$85.50; \$86.00; \$86.50; \$87.00; \$87.50; \$88.00; \$88.50; \$89.00; \$89.50; \$90.00; \$90.50; \$91.00; \$91.50; \$92.00; \$92.50; \$93.00; \$93.50; \$94.00; \$94.50; \$95.00; \$95.50; \$96.00; \$96.50; \$97.00; \$97.50; \$98.00; \$98.50; \$99.00; \$99.50; \$100.00; \$100.50; \$101.00; \$101.50; \$102.00; \$102.50; \$103.00; \$103.50; \$104.00; \$104.50; \$105.00; \$105.50; \$106.00; \$106.50; \$107.00; \$107.50; \$108.00; \$108.50; \$109.00; \$109.50; \$110.00; \$110.50; \$111.00; \$111.50; \$112.00; \$112.50; \$113.00; \$113.50; \$114.00; \$114.50; \$115.00; \$115.50; \$116.00; \$116.50; \$117.00; \$117.50; \$118.00; \$118.50; \$119.00; \$119.50; \$120.00; \$120.50; \$121.00; \$121.50; \$122.00; \$122.50; \$123.00; \$123.50; \$124.00; \$124.50; \$125.00; \$125.50; \$126.00; \$126.50; \$127.00; \$127.50; \$128.00; \$128.50; \$129.00; \$129.50; \$130.00; \$130.50; \$131.00; \$131.50; \$132.00; \$132.50; \$133.00; \$133.50; \$134.00; \$134.50; \$135.00; \$135.50; \$136.00; \$136.50; \$137.00; \$137.50; \$138.00; \$138.50; \$139.00; \$139.50; \$140.00; \$140.50; \$141.00; \$141.50; \$142.00; \$142.50; \$143.00; \$143.50; \$144.00; \$144.50; \$145.00; \$145.50; \$146.00; \$146.50; \$147.00; \$147.50; \$148.00; \$148.50; \$149.00; \$149.50; \$150.00; \$150.50; \$151.00; \$151.50; \$152.00; \$152.50; \$153.00; \$153.50; \$154.00; \$154.50; \$155.00; \$155.50; \$156.00; \$156.50; \$157.00; \$157.50; \$158.00; \$158.50; \$159.00; \$159.50; \$160.00; \$160.50; \$161.00; \$161.50; \$162.00; \$162.50; \$163.00; \$163.50; \$164.00; \$164.50; \$165.00; \$165.50; \$166.00; \$166.50; \$167.00; \$167.50; \$168.00; \$168.50; \$169.00; \$169.50; \$170.00; \$170.50; \$171.00; \$171.50; \$172.00; \$172.50; \$173.00; \$173.50; \$174.00; \$174.50; \$175.00; \$175.50; \$176.00; \$176.50; \$177.00; \$177.50; \$178.00; \$178.50; \$179.00; \$179.50; \$180.00; \$180.50; \$181.00; \$181.50; \$182.00; \$182.50; \$183.00; \$183.50; \$184.00; \$184.50; \$185.00; \$185.50; \$186.00; \$186.50; \$187.00; \$187.50; \$188.00; \$188.50; \$189.00; \$189.50; \$190.00; \$190.50; \$191.00; \$191.50; \$192.00; \$192.50; \$193.00; \$193.50; \$194.00; \$194.50; \$195.00; \$195.50; \$196.00; \$196.50; \$197.00; \$197.50; \$198.00; \$198.50; \$199.00; \$199.50; \$200.00; \$200.50; \$201.00; \$201.50; \$202.00; \$202.50; \$203.00; \$203.50 |
|--|

Stanley's Duplex..... 20@20.10&10%  
Woods' Extension..... 33.45

### Poachers, Egg—

Buffalo Steam Egg Poachers, # doz.  
No. 1, \$6.00; No. 2, \$3.00; No. 3,  
\$2.00; No. 4, \$12.00..... 50%

### Points, Glaziers—

Bulk and 1 lb. papers..... lb. 84c  
1/4-lb. papers..... lb. 84c  
1/2-lb. papers..... lb. 84c

### Pokes, Animal—

Ft. Madison Hawkeye..... # doz. \$3.25  
Ft. Madison Western..... # doz. \$4.00

### Police Goods—

Manufacturers' Lists..... 25@25&10%  
Tower's..... 25%

### Polish—Metal—

Prestoline Liquid, No. 1 (1/2 pt.), # doz.  
\$3.00; No. 2 (1 qt.), \$9.75..... 40%  
Prestoline Paste..... 40&10%  
George William Hoffman:  
U. S. Metal Polish Paste, 3 oz. boxes, #  
doz. 50c; # gr. \$4.50; 1/2 lb. boxes, #  
doz. \$1.25; 1 lb. boxes, # doz. \$2.25;  
U. S. Liquid, 8 oz. cans, # doz. \$1.25;  
# gr. \$12.00.  
Barkeepers' Friend Metal Polish, # doz.  
\$1.75; # gr. \$15.00.  
Wynn's White Silk, 1/2 pt. cans, # doz.  
..... 22.00

### Stove—

Black Eagle Benzine Paste, 5 lb. cans..... 10c  
Black Eagle, Liquid, 1/2 pt. cans # doz. 75c  
Black Jack Paste, 1/2 lb. cans, # gro. 75c  
Black Kid Paste, 5 lb. cans, each, 80c  
Ladd's Black Beauty, # gr. \$10.00..... 50%  
Joseph Dixon's, # gr. \$5.75..... 10%  
Dixon's Plumbago, # gr. \$2.50..... 10%  
Fireside..... # gr. \$2.50  
Gem, # gr. \$4.50..... 10%  
Japanese..... # gr. \$3.50  
Jet Black..... # gr. \$3.50  
Peerless Iron Enamel, 10 oz. cans..... 1.50  
Wynn's:  
Black Silk, 5 lb. pail..... each 70c  
Black Silk, 1 lb. box..... # doz. \$1.00  
Black Silk, 5 oz. box..... # doz. \$0.75  
Black Silk, 1/2 pt. liq..... # doz. \$1.00

### Poppers, Corn—

1 qt., Square..... gro. \$2.00  
1 qt., Round..... gro. \$10.00  
1/2 qt., Square..... gro. \$1.00  
2 qt., Square..... gro. \$1.00

### Post Hole and Tree Augers and Diggers—

See also Diggers, Post Hole, &c.

### Posts, Steel—

Steel Fence Posts, each, 5 ft., 42¢; 6  
ft., 46¢; 6 ft., 48¢.  
Steel Hitching Posts, each..... \$1.30

### Potato Parers—

See Parers, Potato.

### Pots—Glue—

Enamelled..... 60%  
Tinned..... 30%

### Powder—

In Canisters:  
Duck, 1 lb. each..... 45c  
Fine Sporting, 1 lb. each..... 75c  
Rifle, 1/2 lb. each..... 15c  
Rifle, 1 lb. each..... 25c  
King's Smokeless:  
Keg (25 lb. bulk)..... \$6.50  
Half Keg (12 1/2 lb. bulk)..... \$3.50  
Quarter Keg (6 1/4 lb. bulk)..... \$1.90  
Case 34 (1 lb. cans bulk)..... \$3.50  
Half case (1 lb. cans bulk)..... \$1.50  
King's Smokeless: Shot Gun Rifle  
Keg (25 lb. bulk)..... \$12.00 \$15.00  
Half Keg (12 1/2 lb. bulk) 6.25 7.75  
Quarter Keg (6 1/4 lb. bulk) 3.25 4.00  
Case 34 (1 lb. cans bulk) 14.00 17.00  
Half case (1 lb. cans bulk) 7.25 8.75  
Robin Hood Smokeless Shot Gun..... 50&30%

### Presses—

Fruit and Jelly—  
Enterprise Mfg. Co..... 20&20%  
Sensible..... 30&5%  
2 qt., \$2.00; 4 qt., \$4.00; 10 qt., \$6.00 each.

### Seal Presses—

Morrill's No. 1, per doz. \$20.00..... 50%

### Pruning Hooks and Shears—See Shears.

### Pullers, Nail—

Cyclops..... 50%  
Dudley Improved Nail Puller..... 30%  
Miller's Falls, No. 3, per doz. \$12.00..... 30&10%

Pearson No. 1, Cyclone Spike Puller,  
each \$30.00..... 30%  
Pelican, # doz. \$9.00..... 40&10%  
Scranton Case Lots:  
No. 2 B (large)..... \$5.50  
No. 2 B (small)..... \$2.00  
Smith & Hemenway Co.:  
Ajax..... 60%  
Diamond B, No. 2, case lots, # doz. \$6.00  
Diamond B, No. 2, case lots, # doz. \$5.50  
Eureka..... 30%  
Giant, No. 1, # doz. \$18; No. 2, \$16.50;  
No. 3, \$15..... 40%  
Yankee..... 60%

### Pulleys—Single Wheel—

Inch..... 2 3/4 3  
Avening, doz. \$0.55 25 1.15  
Hay Fork, Swivel or Solid Eye.....  
doz., 1 in. \$1.15; 2 in. \$1.40  
Inch..... 2 3/4 3  
Hot House, doz. \$0.70 80 1.25  
Inch..... 1 1/4 1 1/2 1 3/4 2  
Screw..... doz. \$0.16 19 30 30  
Inch..... 1 1/4 1 1/2 1 3/4 2  
Side..... doz. \$0.30 40 55 65  
Inch..... 1 1/4 1 1/2 1 3/4 2  
Tackle..... doz. \$0.30 45 55 1.00

Stowell's:  
Ceiling or End, Anti-Friction..... 60&10%  
Dumb Waiter, Anti-Friction..... 60&10%  
Electric Light..... 60%  
Side, Anti-Friction..... 60&10%

### Sash Pulleys—

Common Frame; Square or Round  
End, per doz., 1 1/4 and 2 in., 100@19c  
Auger Mortise, no Face Plate, per  
doz. 1 1/4 and 2 in., 100@19c  
Auger Mortise, with Face Plate, per  
doz. 1 1/4 and 2 in., 100@19c  
Acme..... 1 1/2 in., 16c; 2 in., 19c  
Common Sense, 1 1/2 in., # doz. 18c;  
2 in., 20c.  
Fox-All-Steel, Nos. 3 and 7, 2 in., # doz. 50c  
Grand Rapids All Steel Noiseless..... 50%  
Ideal..... 70&5%  
Niagara..... 1 1/2 in., 16c; 2 in., 19c  
No. 28, Troy..... 1 1/2 in., 14c; 2 in., 16c  
Star..... 1 1/2 in., 16c; 2 in., 19c  
Tackle Blocks—See Blocks.

### Pumps—

Cistern..... 60@6&10%  
Pitcher Spout..... 80@80&10%  
Woods..... 50@50&10%

### Pump Leathers—

Plunger and Lower Valve—Per gro.:  
Inch..... 2 3/4 3 3/4 4 3/4  
Inch..... 3 3/4 4 3/4 5 3/4  
Inch..... 4 3/4 5 3/4 6 3/4

Plunger Cup Leathers—Per 100:  
Inch..... 2 3/4 3 3/4 4 3/4  
Inch..... 4 3/4 5 3/4 6 3/4

Barnes Dbl. Acting (low list)..... 50&10%  
Contractors' Rubber Diaphragm No. 2  
B. & L. Block Co..... \$16.00  
Daisy Spray Pump..... # doz. \$7.50  
Flint & Walling's Fast Mail (low list)..... 50%  
Flint & Walling's Pitcher Spout..... 50%  
National Specialty Mfg. Co., Measur-  
ing..... 90%  
Mechanical Sprayer..... \$7.50  
Myer's Pumps, low list..... 50%  
Myer's Power Pumps..... 90%  
Myer's Spray Pumps..... 50%

### Punches—

Saddlers' or Drive, good..... doz. 65@70c  
Spring, single tube, good quality.....  
\$1.75@3.75

Revolving (tubes)..... doz. \$3.50@5.75  
Bemis & Call Co.'s Cast Steel Drive..... 50%  
Bemis & Call Co.'s Check..... 50%  
Benard Spring Belt Punches..... 30&5%  
Lodi Spring Belt Punches..... 50%  
Morrill's No. 1 (A.B.C.), # doz., \$15.00..... 30%  
No. 2, # doz. \$22.50..... 30%  
Hercules, each \$7.50..... 30%  
Niagara Hollow Punches..... 40%  
Niagara Solid Punches..... 55&10%  
Paragon Spring Belt Punches..... 30%  
Steel Screw, D. & K. Mfg. Co..... 40%  
Timbers' Hollow, P. S. & W. Co., 35&5%  
Timbers' Solid, P. S. & W. Co., # doz.,  
\$1.44..... 60%

### Rail—

Barn Door, &c.—  
Cast Iron, Barn Door; Flange Screw  
Holes for Rd. Groove Wheels:  
Inch..... 1 1/2 2 1/2 3 1/2 4 1/2 5 1/2 6 1/2 7 1/2 8 1/2 9 1/2 10 1/2 11 1/2 12 1/2 13 1/2 14 1/2 15 1/2 16 1/2 17 1/2 18 1/2 19 1/2 20 1/2 21 1/2 22 1/2 23 1/2 24 1/2 25 1/2 26 1/2 27 1/2 28 1/2 29 1/2 30 1/2 31 1/2 32 1/2 33 1/2 34 1/2 35 1/2 36 1/2 37 1/2 38 1/2 39 1/2 40 1/2 41 1/2 42 1/2 43 1/2 44 1/2 45 1/2 46 1/2 47 1/2 48 1/2 49 1/2 50 1/2 51 1/2 52 1/2 53 1/2 54 1/2 55 1/2 56 1/2 57 1/2 58 1/2 59 1/2 60 1/2 61 1/2 62 1/2 63 1/2 64 1/2 65 1/2 66 1/2 67 1/2 68 1/2 69 1/2 70 1/2 71 1/2 72 1/2 73 1/2 74 1/2 75 1/2 76 1/2 77 1/2 78 1/2 79 1/2 80 1/2 81 1/2 82 1/2 83 1/2 84 1/2 85 1/2 86 1/2 87 1/2 88 1/2 89 1/2 90 1/2 91 1/2 92 1/2 93 1/2 94 1/2 95 1/2 96 1/2 97 1/2 98 1/2 99 1/2 100 1/2 101 1/2 102 1/2 103 1/2 104 1/2 105 1/2 106 1/2 107 1/2 108 1/2 109 1/2 110 1/2 111 1/2 112 1/2 113 1/2 114 1/2 115 1/2 116 1/2 117 1/2 118 1/2 119 1/2 120 1/2 121 1/2 122 1/2 123 1/2 124 1/2 125 1/2 126 1/2 127 1/2 128 1/2 129 1/2 130 1/2 131 1/2 132 1/2 133 1/2 134 1/2 135 1/2 136 1/2 137 1/2 138 1/2 139 1/2 140 1/2 141 1/2 142 1/2 143 1/2 144 1/2 145 1/2 146 1/2 147 1/2 148 1/2 149 1/2 150 1/2 151 1/2 152 1/2 153 1/2 154 1/2 155 1/2 156 1/2 157 1/2 158 1/2 159 1/2 160 1/2 161 1/2 162 1/2 163 1/2 164 1/2 165 1/2 166 1/2 167 1/2 168 1/2 169 1/2 170 1/2 171 1/2 172 1/2 173 1/2 174 1/2 175 1/2 176 1/2 177 1/2 178 1/2 179 1/2 180 1/2 181 1/2 182 1/2 183 1/2 184 1/2 185 1/2 186 1/2 187 1/2 188 1/2 189 1/2 190 1/2 191 1/2 192 1/2 193 1/2 194 1/2 195 1/2 196 1/2 197 1/2 198 1/2 199 1/2 200 1/2 201 1/2 202 1/2 203 1/2 204 1/2 205 1/2 206 1/2 207 1/2 208 1/2 209 1/2 210 1/2 211 1/2 212 1/2 213 1/2 214 1/2 215 1/2 216 1/2 217 1/2 218 1/2 219 1/2 220 1/2 221 1/2 222 1/2 223 1/2 224 1/2 225 1/2 226 1/2 227 1/2 228 1/2 229 1/2 230 1/2 231 1/2 232 1/2 233 1/2 234 1/2 235 1/2 236 1/2 237 1/2 238 1/2 239 1/2 240 1/2 241 1/2 242 1/2 243 1/2 244 1/2 245 1/2 246 1/2 247 1/2 248 1/2 249 1/2 250 1/2 251 1/2 252 1/2 253 1/2 254 1/2 255 1/2 256 1/2 257 1/2 258 1/2 259 1/2 260 1/2 261 1/2 262 1/2 263 1/2 264 1/2 265 1/2 266 1/2 267 1/2 268 1/2 269 1/2 270 1/2 271 1/2 272 1/2 273 1/2 274 1/2 275 1/2 276 1/2 277 1/2 278 1/2 279 1/2 280 1/2 281 1/2 282 1/2 283 1/2 284 1/2 285 1/2 286 1/2 287 1/2 288 1/2 289 1/2 290 1/2 291 1/2 292 1/2 293 1/2 294 1/2 295 1/2 296 1/2 297 1/2 298 1/2 299 1/2 300 1/2 301 1/2 302 1/2 303 1/2 304 1/2 305 1/2 306 1/2 307 1/2 308 1/2 309 1/2 310 1/2 311 1/2 312 1/2 313 1/2 314 1/2 315 1/2 316 1/2 317 1/2 318 1/2 319 1/2 320 1/2 321 1/2 322 1/2 323 1/2 324 1/2 325 1/2 326 1/2 327 1/2 328 1/2 329 1/2 330 1/2 331 1/2 332 1/2 333 1/2 334 1/2 335 1/2 336 1/2 337 1/2 338 1/2 339 1/2 340 1/2 341 1/2 342 1/2 343 1/2 344 1/2 345 1/2 346 1/2 347 1/2 348 1/2 349 1/2 350 1/2 351 1/2 352 1/2 353 1/2 354 1/2 355 1/2 356 1/2 357 1/2 358 1/2 359 1/2 360 1/2 361 1/2 362 1/2 363 1/2 364 1/2 365 1/2 366 1/2 367 1/2 368 1/2 369 1/2 370 1/2 371 1/2 372 1/2 373 1/2 374 1/2 375 1/2 376 1/2 377 1/2 378 1/2 379 1/2 380 1/2 381 1/2 382 1/2 383 1/2 384 1/2 385 1/2 386 1/2 387 1/2 388 1/2 389 1/2 390 1/2 391 1/2 392 1/2 393 1/2 394 1/2 395 1/2 396 1/2 397 1/2 398 1/2 399 1/2 400 1/2 401 1/2 402 1/2 403 1/2 404 1/2 405 1/2 406 1/2 407 1/2 408 1/2 409 1/2 410 1/2 411 1/2 412 1/2 413 1/2 414 1/2 415 1/2 416 1/2 417 1/2 418 1/2 419 1/2 420 1/2 421 1/2 422 1/2 423 1/2 424 1/2 425 1/2 426 1/2 427 1/2 428 1/2 429 1/2 430 1/2 431 1/2 432 1/2 433 1/2 434 1/2 435 1/2 436 1/2 437 1/2 438 1/2 439 1/2 440 1/2 441 1/2 442 1/2 443 1/2 444 1/2 445 1/2 446 1/2 447 1/2 448 1/2 449 1/2 450 1/2 451 1/2 452 1/2 453 1/2 454 1/2 455 1/2 456 1/2 457 1/2 458 1/2 459 1/2 460 1/2 461 1/2 462 1/2 463 1/2 464 1/2 465 1/2 466 1/2 467 1/2 468 1/2 469 1/2 470 1/2 471 1/2 472 1/2 473 1/2 474 1/2 475 1/2 476 1/2 477 1/2 478 1/2 479 1/2 480 1/2 481 1/2 482 1/2 483 1/2 484 1/2 485 1/2 486 1/2 487 1/2 488 1/2 489 1/2 490 1/2 491 1/2 492 1/2 493 1/2 494 1/2 495 1/2 496 1/2 497 1/2 498 1/2 499 1/2 500 1/2 501 1/2 502 1/2 503 1/2 504 1/2 505 1/2 506 1/2 507 1/2 508 1/2 509 1/2 510 1/2 511 1/2 512 1/2 513 1/2 514 1/2 515 1/2 516 1/2 517 1/2 518 1/2 519 1/2 520 1/2 521 1/2 522 1/2 523 1/2 524 1/2 525 1/2 526 1/2 527 1/2 528 1/2 529 1/2 530 1/2 531 1/2 532 1/2 533 1/2 534 1/2 535 1/2 536 1/2 537 1/2 538 1/2 539 1/2 540 1/2 541 1/2 542 1/2 543 1/2 544 1/2 545 1/2 546 1/2 547 1/2 548 1/2 549 1/2 550 1/2 551 1/2 552 1/2 553 1/2 554 1/2 555 1/2 556 1/2 557 1/2 558 1/2 559 1/2 560 1/2 561 1/2 562 1/2 563 1/2 564 1/2 565 1/2 566 1/2 567 1/2 568 1/2 569 1/2 570 1/2 571 1/2 572 1/2 573 1/2 574 1/2 575 1/2 576 1/2 577 1/2 578 1/2 579 1/2 580 1/2 581 1/2 582 1/2 583 1/2 584 1/2 585 1/2 586 1/2 587 1/2 588 1/2 589 1/2 590 1/2 591 1/2 592 1/2 593 1/2 594 1/2 595 1/2 596 1/2 597 1/2 598 1/2 599 1/2 600 1/2 601 1/2 602 1/2 603 1/2 604 1/2 605 1/2 606 1/2 607 1/2 608 1/2 609 1/2 610 1/2 611 1/2 612 1/2 613 1/2 614 1/2 615 1/2 616 1/2 617 1/2 618 1/2 619 1/2 620 1/2 621 1/2 622 1/2 623 1/2 624 1/2 625 1/2 626 1/2 627 1/2 628 1/2 629 1/2 630 1/2 631 1/2 632 1/2 633 1/2 634 1/2 635 1/2 636 1/2 637 1/2 638 1/2 639 1/2 640 1/2 641 1/2 642 1/2 643 1/2 644 1/2 645 1/2 646 1/2 647 1/2 648 1/2 649 1/2 650 1/2 651 1/2 652 1/2 653 1/2 654 1/2 655 1/2 656 1/2 657 1/2 658 1/2 659 1/2 660 1/2 661 1/2 662 1/2 663 1/2 664 1/2 665 1/2 666 1/2 667 1/2 668 1/2 669 1/2 670 1/2 671 1/2 672 1/2 673 1/2 674 1/2 675 1/2 676 1/2 677 1/2 678 1/2 679 1/2 680 1/2 681 1/2 682 1/2 683 1/2 684 1/2 685 1/2 686 1/2 687 1/2 688 1/2 689 1/2 690 1/2 691 1/2 692 1/2 693 1/2 694 1/2 695 1/2 696 1/2 697 1/2 698 1/2 699 1/2 700 1/2 701 1/2 702 1/2 703 1/2 704 1/2 705 1/2 706 1/2 707 1/2 708 1/2 709 1/2 710 1/2 711 1/2 712 1/2 713 1/2 714 1/2 715 1/2 716 1/2 717 1/2 718 1/2 719 1/2 720 1/2 721 1/2 722 1/2 723 1/2 724 1/2 725 1/2 726 1/2 727 1/2 728 1/2 729 1/2 730 1/2 731 1/2 732 1/2 733 1/2 734 1/2 735 1/2 736 1/2 737 1/2 738 1/2 739 1/2 740 1/2 741 1/2 742 1/2 743 1/2 744 1/2 745 1/2 746 1/2 747 1/2 748 1/2 749 1/2 750 1/2 751 1/2 752 1/2 753 1/2 754 1/2 755 1/2 756 1/2 757 1/2 758 1/2 759 1/2 760 1/2 761 1/2 762 1/2 763 1/2 764 1/2 765 1/2 766 1/2 767 1/2 768 1/2 769 1/2 770 1/2 771 1/2 772 1/2 773 1/2 774 1/2 775 1/2 776 1/2 777 1/2 778 1/2 779 1/2 780 1/2 781 1/2 782 1/2 783 1/2 784 1/2 785 1/2 786 1/2 787 1/2 788 1/2 789 1/2 790 1/2 791 1/2 792 1/2 793 1/2 794 1/2 795 1/2 796 1/2 797 1/2 798 1/2 799 1/2 800 1/2 801 1/2 802 1/2 803 1/2 804 1/2 805 1/2 806 1/2 807 1/2 808 1/2 809 1/2 810 1/2 811 1/2 812 1/2 813 1/2 814 1/2 815 1/2 816 1/2 817 1/2 818 1/2 819 1/2 820 1/2 821 1/2 822 1/2 823 1/2 824 1/2 825 1/2 826 1/2 827 1/2 828 1/2 829 1/2 830 1/2 831 1/2 832 1/2 833 1/2 834 1/2 835 1/2 836 1/2 837 1/2 838 1/2 839 1/2 840 1/2 841 1/2 842 1/2 843 1/2 844 1/2 845 1/2 846 1/2 847 1/2 848 1/2 849 1/2 850 1/2 851 1/2 852 1/2 853 1/2 854 1/2 855 1/2 856 1/2 857 1/2 858 1/2 859 1/2 860 1/2 861 1/2 862 1/2 863 1/2 864 1/2 865 1/2 866 1/2 867 1/2 868 1/2 869 1/2 870 1/2 871 1/2 872 1/2 873 1/2 874 1/2 875 1/2 876 1/2 877 1/2 878 1/2 879 1/2 880 1/2 881 1/2 882 1/2 883 1/2 884 1/2 885 1/2 886 1/2 887 1/2 888 1/2 889 1/2 890 1/2 891 1/2 892 1/2 893 1/2 894 1/2 895 1/2 896 1/2 897 1/2 898 1/2 899 1/2 900 1/2 901 1/2 902 1/2 903 1/2 904 1/2 905 1/2 906 1/2 907 1/2 908 1/2 909 1/2 910 1/2 911 1/2 912 1/2 913 1/2 914 1/2 915 1/2 916 1/2 917 1/2 918 1/2 919 1/2 920 1/2 921 1/2 922 1/2 923 1/2 924 1/2 925 1/2 926 1/2 927 1/2 928 1/2 929 1/2 930 1/2 931 1/2 932 1/2 933 1/2 934 1/2 935 1/2 936 1/2 937 1/2 938 1/2 939 1/2 940 1/2 941 1/2 942 1/2 943 1/2 944 1/2



**Screws—Bench and Hand—**

Bench, Iron, doz. 1 in., \$2.50 @ \$2.75;  
1 1/2, \$3.00 @ \$3.25;  
Bench, Wood, Beech, doz. 30 @ \$0.45  
Hand, Wood, doz. 30 @ \$0.45  
R. Bliss Mfg. Co., Hand, doz. 30 @ \$0.45  
Chapin-Stephens Co., Hand, doz. 30 @ \$0.45  
Ohio Tool Co., Bench and Hand, doz. 30 @ \$0.45  
Coach, Lag and Hand Rail—  
Lag, Common Point, list Oct. 1,  
99, doz. 80 @ \$0.55  
Coach and Lag, Gimlet Point, list  
Oct. 1, '99, doz. 80 @ \$0.55  
Hand Rail, list Jan. 1, '91, 70 @ \$1.00 @ \$1.25

**Jack Screws—**

Standard List, doz. 75 @ \$1.00 @ \$1.25  
Millers Falls, doz. 50 @ \$1.00 @ \$1.25  
Millers Falls, Roller, doz. 50 @ \$1.00 @ \$1.25  
P. S. & W., doz. 50 @ \$1.00 @ \$1.25  
Sargent, doz. 50 @ \$1.00 @ \$1.25

**Machine—**

List Jan. 1, '98,  
Flat or Round Head, Iron, 50 @ \$0.50 @ \$1.00  
Flat or Round Head, Brass, 50 @ \$0.50 @ \$1.00

**Set and Cap—**

Set (Iron or Steel), doz. 75 @ \$1.00 @ \$1.25  
Sq. Hd. Cap, doz. 70 @ \$1.00 @ \$1.25  
Hex. Hd. Cap, doz. 70 @ \$1.00 @ \$1.25  
Rd. or Pillar Hd. Cap, doz. 70 @ \$1.00 @ \$1.25

**Wood—**

List July 23, 1903,  
Manufacturers' printed discounts:  
Flat Head, Iron, doz. 75 @ \$1.00 @ \$1.25  
Round Head, Iron, doz. 75 @ \$1.00 @ \$1.25  
Flat Head, Brass, doz. 75 @ \$1.00 @ \$1.25  
Round Head, Brass, doz. 75 @ \$1.00 @ \$1.25  
Flat Head, Bronze, doz. 75 @ \$1.00 @ \$1.25  
Round Head, Bronze, doz. 75 @ \$1.00 @ \$1.25  
Drive Screws, doz. 75 @ \$1.00 @ \$1.25

**Scroll Saws—See Saws, Scroll—**

**Scythes—** Per doz.  
Clipper Pattern, Grass, doz. 45 @ \$5.00 @ \$5.50  
Full Polished Clipper, doz. 45 @ \$5.00 @ \$5.50  
Grain, doz. 45 @ \$5.00 @ \$5.50  
Clipper, Grass, doz. 45 @ \$5.00 @ \$5.50  
Weed and Bush, doz. 45 @ \$5.00 @ \$5.50

**Seeders—Raisin—**

Enterprise, doz. 45 @ \$30.00 @ \$35.00  
**Sets—Awl and Tool—**  
Brad Awl and Tool Sets:  
Wood Hdl., 10 Awls doz. \$3.00 @ \$3.25  
Wood Hdl., 14 Awls, 6 Tools,  
doz. \$3.50 @ \$3.75

Aiken's Sets, Awl and Tools:  
No. 30, doz. \$10.00 @ \$11.00  
Fray's Adj. Tool Hdl., Nos. 1, \$12; 2, \$13; 3, \$14; 4, \$15; 5, \$16;  
C. E. Jennings & Co.'s Model Tool  
Holders, doz. \$8.00 @ \$10.00  
Millers Falls Adj. Tool Hdl., No. 1,  
\$12; No. 4, \$12; No. 5, \$13; No. 15, \$15  
Stanley's Excelcor:  
No. 1, \$7.50; No. 2, \$4.00; No. 3,  
\$5.50; No. 30, \$30.00 @ \$31.00

**Garden Tool Sets—**

Ft. Madison, Three Piece, Hoe, Rake  
and Shovel, doz. \$8.00 @ \$9.00

**Nail—**

Square, doz. 30 @ \$2.35 @ \$2.50  
Round, Bk. and Pol., assorted, doz.  
30 @ \$1.80 @ \$2.00  
Oakagon, doz. \$1.80 @ \$2.00  
Buck Brothers, doz. \$1.80 @ \$2.00  
Cannon's Diamond Point, per gr. \$13.35  
Mayhew's, doz. 30 @ \$2.00  
Snell's Corrugated, Cup Pt. per gr. \$7.50  
Snell's Knurled, Cup Pt., per gr. \$7.50

**Rivet—**

Regular list, doz. 70 @ \$1.00 @ \$1.25

**Saw—**

Aiken's, doz. 50 @ \$1.00 @ \$1.25  
Genuine, doz. 50 @ \$1.00 @ \$1.25  
Imitation, doz. 50 @ \$1.00 @ \$1.25  
Atkin's, doz. 40 @ \$1.00 @ \$1.25  
Criterion, doz. 40 @ \$1.00 @ \$1.25  
Adjustable, doz. 40 @ \$1.00 @ \$1.25  
Bemis & Call Co.'s, doz. 40 @ \$1.00 @ \$1.25  
Cross Cut, doz. 40 @ \$1.00 @ \$1.25  
Plate, doz. 40 @ \$1.00 @ \$1.25  
Spring Hammer, doz. 40 @ \$1.00 @ \$1.25  
Diaton's Star and Monarch, doz. 40 @ \$1.00 @ \$1.25  
Morrell's No. 1, \$15.00; No. 2, \$10.00;  
Nos. 3 and 4, Cross Cut, \$20.00;  
No. 5, Mill, \$30.00;  
No. 10, 11, 12, \$15.00;  
No. 1 Old Style, \$10.00;  
Special, \$16.25;  
Giant Royal, Cross Cut, doz. \$2.50  
Royal Hand, doz. \$2.50  
Taintor Positive, doz. \$2.50

**Shaving—**

Fox Shaving Set, No. 30, per doz. \$24.00 net

**Sharpeners, Knife—**

Chicago Wheel & Mfg. Co., doz. 60 @ \$1.00 @ \$1.25

**Shaves Spoke—**

Iron, doz. \$1.00 @ \$1.15  
Wood, doz. \$1.00 @ \$1.15  
Bailey's (Stanley B. & L. Co.), doz. 70 @ \$1.00 @ \$1.25

**Shears—**

Cast Iron, 7 9 in., doz. 15 @ \$1.00 @ \$1.25  
Best, doz. 15 @ \$1.00 @ \$1.25  
Good, doz. 15 @ \$1.00 @ \$1.25  
Cheap, doz. 15 @ \$1.00 @ \$1.25  
Straight Trimmers, etc., doz. 15 @ \$1.00 @ \$1.25

**Best quality, Jap., doz. 70 @ \$1.00 @ \$1.25****Fair qual. Jap., doz. 80 @ \$1.00 @ \$1.25****Tailors' Shears, doz. 70 @ \$1.00 @ \$1.25****Acme Cast Shears, doz. 40 @ \$1.00 @ \$1.25****Helmich's Tailors' Shears, doz. 100 @ \$1.00 @ \$1.25****Wilkinson's Hedge, doz. 100 @ \$1.00 @ \$1.25****Wilkinson's Branch, Lawn and Border, doz. 40 @ \$1.00 @ \$1.25****Wilkinson's Sheep, 1900 list, doz. 50 @ \$1.00 @ \$1.25****Tinners' Snips, doz. 30 @ \$1.00 @ \$1.25****Steel Laid Blades, doz. 10 @ \$1.00 @ \$1.25****Forged Handles, Steel Blades, Berlin, doz. 40 @ \$1.00 @ \$1.25**

Helmich's Snips, doz. 40 @ \$1.00 @ \$1.25  
Jennings & Griffin Mfg. Co.'s, 6 1/2 to 10  
inch, doz. 40 @ \$1.00 @ \$1.25  
Niagara Snips, doz. 40 @ \$1.00 @ \$1.25  
P. S. & W. Co., doz. 40 @ \$1.00 @ \$1.25  
Triumph Pipe Shear, doz. 9.00

**Pruning Shears and Tools—**

Cronk's Grape Shears, doz. 30 @ \$1.00 @ \$1.25  
Cronk's Pruning Shears, doz. 30 @ \$1.00 @ \$1.25  
Diaton's Combined Pruning Hook  
and Saw, doz. \$18.00; doz. \$12.00  
Diaton's Pruning Hook, doz. \$12.00  
John T. Henry Mfg. Co.:  
Pruning Shears, all grades, doz. 40 @ \$1.00 @ \$1.25  
Orange Shears, doz. 50 @ \$1.00 @ \$1.25  
Grape, doz. 40 @ \$1.00 @ \$1.25  
Tree Pruners, doz. 70 @ \$1.00 @ \$1.25  
P. S. & W. Co., doz. 30 @ \$1.00 @ \$1.25

**Sheaves—Sliding Door—**

Stowell's Anti-Friction, doz. 50 @ \$1.00 @ \$1.25  
Patent Roller Hatfield's, Sargent's list,  
doz. 70 @ \$1.00 @ \$1.25  
Reading, doz. 50 @ \$1.00 @ \$1.25  
R. & E. list, doz. 30 @ \$1.00 @ \$1.25  
Wrightsville Hatfield Pattern, doz. 50 @ \$1.00 @ \$1.25

**Sliding Shutter—**

Reading list, doz. 50 @ \$1.00 @ \$1.25  
R. & E. list, doz. 30 @ \$1.00 @ \$1.25  
Sargent's list, doz. 50 @ \$1.00 @ \$1.25

**Shells—Shells, Empty—**

Brass Shells, Empty:  
First quality, all gauges, doz. 60 @ \$1.00 @ \$1.25  
Climax, Club, Rival, 10 and 12 gauge,  
doz. 65 @ \$1.00 @ \$1.25

**Paper Shells, Empty—**

Acme Ideal, Lower, New Rapid,  
Magic 10, 12, 16 and 20 gauge, doz. 25 @ \$1.00 @ \$1.25  
Blue Rival, New Climax, Challenge,  
Monarch, Defiance, Repeater, Yellow  
Rival, 10, 12, 16 and 20 gauge, doz. 30 @ \$1.00 @ \$1.25  
Climax, Union, League, New Rival  
10 and 12 gauge, doz. 25 @ \$1.00 @ \$1.25  
Climax, Union, League, New Rival  
14, 16 and 20 gauge (\$7.50 list), doz. 30 @ \$1.00 @ \$1.25  
Expert, Metal Lined and Pigeon, 10,  
12, 16 and 20 gauge, doz. 30 @ \$1.00 @ \$1.25  
Climax, Union, League, New Rival  
10 and 12 gauge, doz. 25 @ \$1.00 @ \$1.25  
Robin Hood, Low Brass, doz. 20 @ \$1.00 @ \$1.25  
Robin Hood, High Brass, doz. 20 @ \$1.00 @ \$1.25

**Shells, Loaded—**

Loaded with Black Powder, doz. 40 @ \$1.00 @ \$1.25  
Loaded with Smokeless Powder,  
medium grade, doz. 40 @ \$1.00 @ \$1.25  
Loaded with Smokeless Powder,  
high grade, doz. 40 @ \$1.00 @ \$1.25  
Robin Hood Smokeless Powder:  
Robin Hood, Low Brass, doz. 20 @ \$1.00 @ \$1.25  
Robin Hood, High Brass, doz. 20 @ \$1.00 @ \$1.25  
Comets, High Brass, doz. 20 @ \$1.00 @ \$1.25

**Shoes, Horse, Mule, &c.—**

F. o. b., Pittsburgh:  
Iron, doz. 40 @ \$1.00 @ \$1.25  
Steel, doz. 40 @ \$1.00 @ \$1.25  
Burden's, all sizes, per keg, \$3.90

**Shot—**

Drop, up to B, 25-lb. bag, \$1.61  
Drop, B and larger, per 25-lb. bag, \$1.85  
Buck, 25-lb. bag, \$1.85  
Chilled, 25-lb. bag, \$1.85

**Shovels and Spades—**

Association List, Nov. 15, 1903, doz. 40 @ \$1.00 @ \$1.25

**Sieves and Sifters—**

Hunter's Imitation, doz. \$10.50 @ \$11.00  
Buffalo Metallic, S. S. Co., per gr.:  
14 & 16, 18 & 20, 18 & 20  
\$13.30 \$13.50 \$14.40  
National Mfg. Co.:  
Victor, doz. 30 @ \$12.00  
Surprise, doz. 30 @ \$11.00  
No Name, doz. 30 @ \$11.00  
Shaker Barier's Pat. Flour Sifters,  
per doz., \$2.00; doz. 30 @ \$1.00 @ \$1.25

**Sieves, Tin Rim—**

Per dozen:  
Mesh, 14 16 18 20  
Black, full size, \$1.50 1.35 1.30 1.35  
Plated, full size, \$1.50 1.35 1.30 1.35  
Black, scant, \$0.65 0.60 0.55 0.50

**Sieves, Wooden Rim—**

Nested, 10, 11 and 12 inch.  
Mesh 18, Nested, doz. \$0.90 @ \$0.95  
Mesh 20, Nested, doz. 1.00 @ 1.05  
Mesh 24, Nested, doz. 1.20 @ 1.40

**Sinks—**

Standard list, doz. 60 @ \$1.00 @ \$1.25  
NOTE.—There is not entire uniformity  
list used by jobbers.

**Skels Wagon—**

Cast Iron, doz. 75 @ \$1.00 @ \$1.25  
Steel, doz. 40 @ \$1.00 @ \$1.25

**Slates, School—**

Factory Shipments.  
"D" Slates, doz. 40 @ \$1.00 @ \$1.25  
Noiseless Slates, doz. 60 @ \$1.00 @ \$1.25

**Slaw Cutters—See Cutters.****Slicers, Vegetable—**

Sterling No. 10, \$2.00; doz. 30 @ \$1.00 @ \$1.25

**Snaps, Harness—**

German, doz. 40 @ \$1.00 @ \$1.25  
Covert Mfg. Co.:  
Derby, doz. 30 @ \$1.00 @ \$1.25  
Jockey, doz. 40 @ \$1.00 @ \$1.25  
Trojan, doz. 40 @ \$1.00 @ \$1.25  
Yankee, doz. 40 @ \$1.00 @ \$1.25  
Yankee, Roller, doz. 30 @ \$1.00 @ \$1.25

**Covert's Saddlery Works:**

Crown, doz. 60 @ \$1.00 @ \$1.25  
German, doz. 60 @ \$1.00 @ \$1.25  
Model, doz. 60 @ \$1.00 @ \$1.25  
Triumph, doz. 60 @ \$1.00 @ \$1.25  
Onida Community  
Solid Swivel, doz. 60 @ \$1.00 @ \$1.25  
Sargent's Patent Guarded, doz. 60 @ \$1.00 @ \$1.25

**Snaths—**

Scythe, doz. 40 @ \$1.00 @ \$1.25

**Snips, Tinners'—See Shears.****Spoons and Forks—****Silver Plated—**

Good Quality, doz. 50 @ \$1.00 @ \$1.25  
Cheap, doz. 60 @ \$1.00 @ \$1.25  
International Silver Co.,  
1847 Rogers Bros. and Rogers & Hamil-  
ton, doz. 40 @ \$1.00 @ \$1.25  
Rogers & Bro., William Rogers Eagle  
Brand, doz. 30 @ \$1.00 @ \$1.25  
Anchor, Rogers Brand, doz. 60 @ \$1.00 @ \$1.25  
Wm. Rogers & Son, doz. 60 @ \$1.00 @ \$1.25

**Miscellaneous—**

German Silver, doz. 60 @ \$1.00 @ \$1.25  
Cattaraugus Cutlery Co.:  
Yukon Silver, doz. 50 @ \$1.00 @ \$1.25

**Tinned Iron—**

Teas, doz. 45 @ \$1.00 @ \$1.25  
Tables, doz. 90 @ \$1.00 @ \$1.25

**Springs—Door—**

Chicago (Coll), doz. 40 @ \$1.00 @ \$1.25  
Gem (Coll), doz. 30 @ \$1.00 @ \$1.25  
Reliance (Coll), doz. 40 @ \$1.00 @ \$1.25  
Star (Coll), doz. 30 @ \$1.00 @ \$1.25  
Torrey's Rod, 39 in., doz. \$1.10  
Victor (Coll), doz. 50 @ \$1.00 @ \$1.25

**Carriage, Wagon, &c.**

1 1/2 in. and Wider: Per Lb.  
Black, doz. 40 @ \$1.00 @ \$1.25  
Half Bright, doz. 40 @ \$1.00 @ \$1.25  
Bright, doz. 40 @ \$1.00 @ \$1.25  
Painted Seat Springs:  
1 1/2 x 22 26, per pr. 42c  
1 1/2 x 3 x 28, per pr. 70c

**Sprinklers, Lawn—**

Enterprise, doz. 25 @ \$30.00 @ \$35.00  
Philadelphia No. 1, per doz. \$13; No. 2,  
\$15; No. 3, \$24

**Squares—**

Nickel plated, Last Jan. 5, 1900,  
Steel and Iron, doz. 70 @ \$1.00 @ \$1.25  
Rosewood Hdl. Try Square and T-  
Bevels, doz. 60 @ \$1.00 @ \$1.25  
Iron Hdl. Try Squares and T-Bevels,  
doz. 60 @ \$1.00 @ \$1.25  
Diaton's Try Sq. and T-Bevels, doz. 70 @ \$1.00 @ \$1.25  
Winterbottom's Try and Miter,  
doz. 40 @ \$1.00 @ \$1.25

**Squeezers—Lemon—**

Wood, Common, gro., No. 6, \$5.25  
@ \$5.50; No. 1, \$6.25 @ \$6.50.  
Wood, Porcelain Lined,  
Cheap, doz. \$1.00  
Good Grade, doz. \$1.25  
Turned Iron, doz. \$0.75 @ \$1.25  
Iron, Porcelain Lined, doz. \$1.75

**Staples—**

Barbed Blind, doz. 60 @ \$1.00 @ \$1.25  
Electricians', Association list, doz. 80 @ \$1.00 @ \$1.25  
Fence Staples, Plain \$2.25; Galva-  
nized, \$2.55  
Poultry Netting, Staples, per lb. 34 @ \$1.00 @ \$1.25  
Grand Crossing Tack Co.'s list, doz. 80 @ \$1.00 @ \$1.25

**Steels, Butchers'—**

Dick's, doz. 30 @ \$1.00 @ \$1.25  
Foster's, doz. 30 @ \$1.00 @ \$1.25  
C. & A. Hoffmann's, doz. 40 @ \$1.00 @ \$1.25

**Steelyards—**

Blacksmiths', doz. 50 @ \$1.00 @ \$1.25

**Stocks and Dies—**

Curby Reversible Ratchet Die Stock, doz. 25 @ \$1.00 @ \$1.25  
Durbey Screw Plates, doz. 25 @ \$1.00 @ \$1.25  
Gardner Die Stocks No. 1, doz. 50 @ \$1.00 @ \$1.25  
Gardner Die Stocks, larger sizes, doz. 40 @ \$1.00 @ \$1.25  
Green River, doz. 25 @ \$1.00 @ \$1.25  
Lightning Screw Plate, doz. 25 @ \$1.00 @ \$1.25  
Reece's New Screw Plates, doz. 25 @ \$1.00 @ \$1.25

**Stone—****Scythe Stones—**

Chicago Wheel & Mfg. Co., 1901 list:  
Gem Corundum, 10 inch, \$3.00 per  
gro., 12 inch, \$3.80  
Norton Emery Scythe Stones:  
Less than gro-s lots, per gro. \$9.00  
One gross or more, per gro. \$7.20  
Lots of 10 gross or more, per gro. \$6.00  
Pike Mfg. Co., 1901 list:  
Black Diamond S. S., per gro. \$12.00  
Lamotte S. S., per gro. \$11.00  
White Mountain S. S., per gro. \$9.00  
Green Mountain S. S., per gro. \$8.00  
Extra Indian Pond S. S., per gro. \$7.50  
No. 1 Indian Pond S. S., per gro. \$7.00  
No. 2 Indian Pond S. S., per gro. \$4.50  
Leader Med End S. S., per gro. \$4.50  
Balance of 1901 list 33 1/2 %

**Oil Stones, &c.**

Chicago Wheel & Mfg. Co., 1901 list:  
Gem Corundum Oil, Double Grit, doz. 50 @ \$1.00 @ \$1.25  
Gem Corundum Oil, Single or Double  
Grit, doz. 50 @ \$1.00 @ \$1.25  
Gem Corundum Slips, doz. 50 @ \$1.00 @ \$1.25  
Gem Corundum Razor Hones, doz. 50 @ \$1.00 @ \$1.25  
Pike Mfg. Co., 1901 list:  
Arkansas Stone, No. 1, 3 to 5 in., \$2.20  
Arkansas Stone, No. 1, 5 to 8 in., \$3.50  
Arkansas Slips No. 1, doz. \$4.00  
Lily White Washita 4 to 8 in., doz. 60 @ \$1.00 @ \$1.25  
Rory Red Washita 4 to 8 in., doz. 60 @ \$1.00 @ \$1.25  
Washita Stone, Extra, 4 to 8 in., doz. 60 @ \$1.00 @ \$1.25  
Washita Stone, No. 1, 4 to 8 in., doz. 40 @ \$1.00 @ \$1.25  
Washita Stone, No. 2, 4 to 8 in., doz. 30 @ \$1.00 @ \$1.25  
Lily White Slips, doz. 90 @ \$1.00 @ \$1.25  
Rory Red Slips, doz. 90 @ \$1.00 @ \$1.25  
Washita Slips, Extra, doz. 90 @ \$1.00 @ \$1.25  
Washita Slips, No. 1, doz. 70 @ \$1.00 @ \$1.25  
India Oil Stones (entire list), doz. 33 1/2 %

Hindustan No. 1, Regular, doz. 30 @ \$1.00 @ \$1.25  
Hindustan No. 1 Small, doz. 30 @ \$1.00 @ \$1.25  
Axe Stones (all kinds), doz. 30 @ \$1.00 @ \$1.25  
Turkey Oil Stones, 4 to 8 in., doz. 30 @ \$1.00 @ \$1.25  
Queer Creek Stones, 4 to 8 in., doz. 30 @ \$1.00 @ \$1.25  
Queer Creek Slips, doz. 30 @ \$1.00 @ \$1.25  
Sand Stone, doz. 30 @ \$1.00 @ \$1.25  
Belgian, German and Swaty Razor  
Hones, doz. 30 @ \$1.00 @ \$1.25  
Natural Grit Carving Knife Hones,  
doz. 30 @ \$1.00 @ \$1.25  
Quick Edge Pocket Knife Hones,  
doz. 30 @ \$1.00 @ \$1.25  
Mounted Kitchen Sand Stone, doz. 30 @ \$1.00 @ \$1.25

**Stoners—Cherry—**

Enterprise, doz. 25 @ \$30.00 @ \$35.00

**Stops, Bench—**

Millers Falls, doz. 15 @ \$1.00 @ \$1.25  
Morrell's, per doz. No. 1, \$10.00; No. 2,  
\$12.50; No. 3, \$15.00  
Whipple's Combination, per doz. \$5.50

**Door—**

Chapin-Stephens Co., doz. 60 @ \$1.00 @ \$1.25

**Plane—**

Chapin-Stephens Co., doz. 20 @ \$1.00 @ \$1.25

**Straps—Box—**

Cary's Universal, case lots, 20 @ \$1.00 @ \$1.25

**Hame—**

Covert's Saddlery Works, doz. 40 @ \$1.00 @ \$1.25

**Stretchers, Carpet—**

Cast Iron, Steel Points, doz. 55 @ \$60.00  
Socket, doz. \$1.75  
Excelsior Stretcher and Tack Hammer  
Combined, per doz. \$6.00

**Stuffers, Sausage—**

Enterprise Mfg. Co., doz. 25 @ \$25.00 @ \$27.50  
National Specialty Mfg. Co., list Jan.  
1, 1902, doz. 30 @ \$30.00 @ \$35.00

**Sweepers, Carpet—**

National Sweeper Co.: Per doz.  
Auditorium, Roller Bearing (26 in.  
case), Nickel, doz. \$5.00  
Mammoth, Roller Bearing (30 in case),  
Nickel, doz. \$6.00  
Marion, Roller Bearing, regular  
business, full Nickel, doz. \$2

| Tools—Coopers'—        |          |
|------------------------|----------|
| L. & J. White          | 20@30&55 |
| Hay—                   |          |
| Myers' Hay Tools       | 50%      |
| Stowell's Hay Carriers | 50%      |
| Stowell's Hay Forks    | 50%      |
| Stowell's Fork Pulleys | 50%      |

| Saw—                        |       |
|-----------------------------|-------|
| Atkins' Cross Cut Saw Tools | 40%   |
| Simonds' Improved           | 35&45 |
| Simonds' Crescent           | 35%   |

| Ship—         |     |
|---------------|-----|
| L. & J. White | 25% |

| Transom Lifters—      |  |
|-----------------------|--|
| See Lifters, Transom. |  |

| Traps—Fly—                  |  |
|-----------------------------|--|
| Balloon, Globe or Acme      | doz. \$1.15 to 1.55; gro. \$11.50 to 15.00 |
| Harper, Champion or Paragon | doz. \$1.25 to 1.50; gro. \$13.00 to 15.00 |

| Game—                     |                          |
|---------------------------|--------------------------|
| Oneida Pattern            | 75¢ to 10¢ to 15¢ to 18¢ |
| Newhouse                  | 45¢ to 45¢ to 55¢        |
| Hawley & Norton           | 65¢ to 65¢ to 75¢        |
| Victor (Oneida Pattern)   | 75¢ to 75¢ to 85¢        |
| O.C. Jump (Blake Pattern) | 60¢ to 60¢ to 10¢        |

| Mouse and Rat—                  |                 |
|---------------------------------|-----------------|
| Mouse, Wood, Choker, doz. holes | 8 1/2¢ to 9¢    |
| Mouse, Round or Square Wire     | doz. 85¢ to 90¢ |

| Marty French Rat and Mouse Traps (Genuine)— |             |
|---|-------------|
| No. 1, Rat, Each \$1.19 1/2; doz. \$12.00   |             |
| No. 3, Rat, \$ do. \$6.00; case of 50       | \$3.25 doz. |
| No. 3 1/2, Rat, \$ do. \$4.75; case of 72   | \$1.25 doz. |
| No. 4, Mouse, \$ do. \$3.50; case of 7      | \$3.75 doz. |
| No. 5, Mouse, \$ do. \$2.75; case of 150    | \$2.35      |

| Schuyler's Rat Killer, No. 1, \$ gr. \$30.00 |               |
|--|---------------|
| No. 2, \$ gr. \$30.00; Mouse, No. 3, \$18.00 |               |
| J. M. Mast Mfg. Co.                          | Per gro. Rat. |

| Blizard—                           |              |
|------------------------------------|--------------|
| No. 12, \$3.00 No. 1, \$9.00       |              |
| Old Nick, No. 10, 2.25 No. 2, 8.40 |              |
| Joker, No. 5, 2.10 No. 3, 8.40     |              |
| Imp'd Snap Shot, Mouse, per gro. 2 | hole, \$2.40 |
| Imp'd Snap Shot, Mouse, per gro. 4 | hole, \$4.20 |

| Trimmers, Spoke—     |         |
|----------------------|---------|
| Bonney's No. 1 and 2 | 39 1/2¢ |
| Wood's E. I.         | 50%     |

| Trowels—                                 |               |
|--|---------------|
| Diston Brick and Pointing                | 30%           |
| Diston Plastering                        | 35%           |
| Diston Standard Brand and Garden Trowels | 35%           |
| Kohler's Steel Garden Trowels, 3 in.     | \$ gr. \$5.00 |
| Kohler's Steel Garden Trowels, 6 in.     | \$ gr. \$6.00 |

| Never-Break Steel Garden Trowels— |        |
|-----------------------------------|--------|
| Rose Brick and Plastering         | \$3.45 |
| Woodrough & McParlin, Plastering  | 35%    |

| Trucks, Warehouse, &c.—              |                  |
|--------------------------------------|------------------|
| B. & L. Block Co.                    |                  |
| New York Pattern                     | 50¢ to 10¢       |
| Western Pattern                      | 60¢ to 10¢       |
| Handy Trucks                         | per doz. \$16.00 |
| Grocery                              | per doz. \$15.00 |
| Daisy Stove Trucks, Improved pattern | \$ do. \$18.50   |
| Model Stove Trucks                   | \$ do. \$18.50   |

|  |                 |
|--|-----------------|
| Kohler's Steel Garden Trowels, 5 in..... | per gro. \$5.00 |
| Kohler's Steel Garden Trowels, 6 in..... | per gro. \$6.00 |
| Never-Break Steel Garden Trowels.....    |                 |